UNIVERSITY STUDENTS AND THE INTERNET:

INFORMATION SEEKING STUDY

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This study explored university students' information needs and seeking behaviors on the Internet. A Web-based survey was administrated one time. Two hundred responses were received from the target sample within the two weeks period of the study. Data were analyzed with descriptive statistics, factor analysis, and graphical representation. The study explored various issues related to the usability, preferences, and activities of the Internet, such as searching tools, e-mail, search engines, and preferred primary sources of everyday-life information needs. The study explored the perceptions of the students toward the Internet and the traditional library. Kuhlthau's model of the information-seeking process, which includes six stages and affective components, was utilized and modified in the construction of the Web survey. A study by Presno (1998), which includes the four types of Internet anxiety, was utilized in the construction of the Web survey.

With regard to the six stages of Kuhlthau model, the majority of the respondents experienced stage 5, which was about information gathering; stage 3 had the next highest number of respondents. Very few respondents experienced stages 1 and 2. There was a systematic pattern in which, the earlier the stages the respondents were in, the more negative adjectives they selected, and vice versa. The feeling adjectives section showed a difference in the behavior between males and females. The results indicated that most

students had Internet time delay anxiety. In general, the study found that students have a great interest in the Internet and consider it an important source of information for their personal, educational, and communication activities.

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CHAPTER 1

INTRODUCTION

Problem Statement

Although there are various studies about students and the Internet, numerous issues await investigation because the Internet is in constant change. Due to the fast development of the Internet, it is expected that the perceptions as well as the information-seeking behavior of the users will change. Models that describe users and their information-seeking behavior on the Internet are few, and most of the models that have been tested were adapted from information retrieval research. The rapid development of the Internet as a significant information source for students meant that there are few models that describe student use and seeking behaviors. Most of the models that have been tested are adapted from the traditional information retrieval research.

Many researchers who investigated the user's information seeking behavior from the Web in the educational environment usually had a qualitative research paradigm. Although these approaches are useful for understanding the phenomenon in great depth, they are limited because of the size of the target sample they can generally handle. There is a need to study users in the educational environment with a larger and more heterogeneous sample from the population. This study targeted university students and their information seeking behavior on the Web. University students are using the Internet more than ever before and consider a vital part of their daily educational learning as well as a helper with their personal needs (GVU's Tenth World Wide Web User Survey, 1999)

Understanding the information needs of students concerning the Internet is a difficult task because users cannot express or define their needs easily. Therefore, relying on previous qualitative studies that are related can help to develop a quantitative study. Developing a scale that represents the different stages of information needs or types of engagement can help the users better recognize their information-seeking activities as well as their needs. This study utilized two qualitative research works in order to develop the Web survey questionnaire, one by Kuhlthau (1993) and the other by Presno (1998).

Kuhlthau's model provided opportunities for possible research that are related to the Internet. Kuhlthau's model of the information search process (ISP) has been tested in many studies concerning students and information seeking, and it has shown stability. Some studies used Kuhlthau's model exactly and without modification for studies related to the electronic environments. In order to utilize the Kuhlthau model with research related to the Internet, some modifications were needed in both the content and the design of the instrument. The Kuhlthau model was originally designed for users of the traditional library in an educational environment. Users who search for information on the Web may not behave the same as those who search for information from the library because of the difference in the amount of information. Also, there is a difference in the physical activities of the two types of users. Users seeking information in a library

usually move from place to place and can touch and see the medium of information, which is not the case with Web users.

Another issue is that previous studies that used the ISP were task oriented; students were given tasks by their teachers and asked to search for information in the library in order to complete their assignment. University students who use the Web would often have tasks or assignments and need to search for information in order to complete their work, but they also might have other purposes for being on the Web. In this study, students were not required to have assignments in order to study their information-seeking behavior within the ISP. Another issue is that the survey instrument of Kuhlthau's model was administered in many studies three times during the search process, during initiation, at midpoint, and at closure. The validity of the instrument then may be questioned because of the reactivity effect issue. Respondents who answered the same survey for the second and third time might be influenced and might give unreliable responses. Therefore, this study surveyed university students and their use of the Internet only at one time in their search processes. Also the researcher investigated what stage of the ISP they were in and whether relationships existed with other variables such as anxiety and demographics.

Kuhlthau's model raises the issue of search anxiety. In order to relate search anxiety to the Web environment, a model of anxiety on the Web was sought. Presno (1998) conducted a qualitative study about students and the Internet and found four areas of anxieties related to the Internet: net search anxiety, Internet time delay anxiety, terminology anxiety, and general fear of the Internet. This study developed a scale for each of these four anxieties in order to learn whether students have any of these anxieties with the Internet.

Significance of the Study

This study seeks to extend our understanding of a fast-changing medium of communication and information known as the Internet. The Internet is considered not only an important tool for education but also as a cultural and social world for many users. There is no doubt that the Internet is changing and developing, with many new concepts and technologies that surpass the imagination. Users of the Internet and, as in this study, especially university students, are learning these new ideas largely on their own and for more than just formal education. Research concerning the preferences, uses, perceptions, and information seeking of the students in educational institutions will help to provide educators and Web specialists with a better understanding of the problems and needs of students, which, in turn, helps to provide better service.

This research used part of Kuhlthau's ISP model (1989) because it has been so widely used over 10 years. The researcher modified it in order to test its utility and applicability in research about the Web. Within that model, a scale measurement was developed for this study that helped the users define their information seeking stage, urgency for information, confidence, feelings, and anxiety with the Internet. It was important to develop such a representative scale measurement of the actual state of the users in education, because users usually have difficulty in specifying their information needs accurately. University students have a high demand for information and conduct many activities over the Internet. Students may experience much anxiety due to their work and needs that conflict with their limited time. Understanding the areas that cause anxieties could help to find better solutions and system development.

Another issue concerns the sources of primary information. There appears to be a shift in users' preferences in regard to everyday-life primary sources of information because of the technological development of the Internet and telecommunications. Therefore, understanding users and their information needs can help to provide better services and better system designs.

This was an exploratory research that sought to study the students in a university and their everyday use and engagement with the Internet. The study examined students use of the Internet in areas related to information seeking-preferences, activities, preferences, and perceptions. Because this is an exploratory study, the two general

hypotheses are based on Kuhlthau's model of information search stages. In addition, the research questions presented in this study are organized into different topics, each of which has a set of specific questions.

General Hypotheses

General Hypothesis 1

Students who search for information on the Internet will experience the six stages of the information search process and experience feelings similar to those on the Kuhlthau model.

General hypothesis 2

Some demographic differences, such as gender, will impact the feelings within the information search process, specifically the stages.

The general hypotheses are followed by the following questions:

Research Questions

The research questions for this study are divided into the following categories:

Response Rate:

Who are the respondents of the study, and what are their demographics and backgrounds?

Usability:

What activities are related to the Internet, and which do the students engage in, such as e-mail, checking grades online, IRC chat, and others?

Which search tools are preferred by students, such as searching under author name, title, journal name, and others?

Which primary sources of everyday-life information needs are preferred by the students, such as the Internet, radio, TV, newspapers, and libraries?

Search Engines:

How much do the students use the Internet search engines, and what are their preferences?

Do they enter a search query directly into the URL address of the Web browser, and how did they learn this technique for the first time?

Perceptions:

How much skill do the students feel they have in using the computer and in Internet searching and use?

What do the students think and prefer concerning information on the Internet, the library, the electronic library catalog, and the regular card catalog?

Internet Activities:

What types of activities did the students engage in during the study that were related to searching for information for educational, personal, and communication?

Internet Activities and the Information Search Process:

Which stage of the information search process did most of the students experience during the study?

Internet Anxiety:

Do students have anxieties with the Internet and to what degree can anxiety be related to use, perceptions, and activities?

An organizational model was proposed that linked students' search for educational and personal information from the Web through the six stages of Kuhlthau' model with the four areas of Internet anxiety, feelings, and demographic background (see Appendix K).

CHAPTER 2

LITRATURE REVIEW

Numerous investigators have researched about the users of the Internet, mostly in areas that described users' demographics, usage frequency, usability, and information preferences. Few researchers have investigated users' information seeking behaviors on the Internet because of the size of the population and complexity of users' behavior. Therefore, adapting a model from research areas that relate to human information seeking behavior might be helpful in understanding about users' information seeking behavior on the Internet. Kuhlthau's Model of information search process has been used many time in research related to users, especially students, information seeking behavior in libraries. This research used part of Kuhlthau's model, modified it, and combined it with another model related to Internet anxiety in order to understand students' information seeking behavior on the Internet. The difference in this study is the researcher used the six stages of the information search process of Kuhlthau model rather differently than most research that adapted the model. The six stages were presented in this study as linear and sequential progression and not random as the original model. Also different wordings were used that were closely related to the basic construct of the model. The study also investigated users' Internet activities, information preferences, usability, perceptions and feelings, and demographics. This chapter will discuss related literature about usability, searching behavior, library, anxiety, information needs, and related models.

Each year more users connect to the Internet and use its variety of services and benefits. According to CommercNet, "As of 1999, there are 92.2 million Internet users over the age of 16 in US/Canada." The educational sector is aware of the need to join the majority and connect to the Internet especially, in public schools, to educate and increase the knowledge of its students. According to the National Center for Educational Statistics, "The percentage of public schools connected to the Internet has increased each year, from 35 percent in 1994 to 95 percent in 1999" (p. 1).

Higher education institutions are connecting to the Internet especially in the research and information areas that improve their libraries. Because the Internet requires to a certain degree, some skills and an understanding of computers and telecommunication as well as the Internet, most Internet users have some level of higher education. According to GVU's Tenth World Wide Web User Survey 1999, Graphic, Visualization, & Usability Center, of the respondents who answered the Web survey, those with high education or a college degree, accounted for 87.8 % of all the respondents (p. 1). Lee (2000) found that, of users who visited the Geographical Information System (GIS) 95% held a university degree. Also, 98% of the respondents used the Web on a daily basis (p. 3). Internet technology and its development began in the United States during the 1960s in the Department of Defense, gaining more popularity with users than in other parts of the world. According to the CommerceNet, users of the Internet in the United States will account for one third of total Internet users in 2002.

Web Preference and Usability

Users of the Internet prefer some aspects of it more than others depending on the user's characteristics and personality. Some of the uses of the Web have changed many of the typical or everyday customs of Internet users. For example, according to the GVU, more users were accustomed to or preferred using the Internet than watching TV or other daily activities; "watching TV is least preferred (8.7%)"(GVU, 1999).

Searching for information, either on the Internet or in the library, especially in universities and colleges, plays a vital role in education and research. Giannini (1998) found that most of the LIS students selected either the Web or the library, with about 45% using the library and 42% using the Web when searching for information. Television and newspapers were not primary, and their use was reported by about 5% of the respondents (p. 369). In a study by Wilson (1997), who studied university undergraduate students and their usage of sources of information, only 25% indicated that they used newspaper articles for research (p. 94).

Students who use the Web are usually doing work and search for information that is related to their educational purposes. Scherer (1997) found that 73% of the students who used the Internet used it at least once a week (p. 658). She found over 90% of weekly Internet access with students using the Internet for educational work accounted 91% of the time. In another study, Bao (1998) found about 80% of students used the

Web on a daily or weekly basis (p. 535). According to Bao, 83% said they used the Internet for information related to education, and 78% for information not related to education (p. 537). Spink (1998) found, in a study of 357 users who responded to an interactive survey about Excite search engine, 72% of the users thought their information from the Web were relevant. This suggests that the users not only think information on the Web is important but also find what they look for on the Web. Spink devised three stages of information gathering that were beginning, still gathering, and completing. The study found most of the users had selected still gathering. The stage "still gathering" is similar to stage 5 in Kuhlthau's model, which also is called gathering information or information collection. Users select certain information over other information because of its relevance to their information needs. There are many factors that influence a user to accept or reject information, including cognitive, situation, and dynamic factors (Schamber, 1995, 1994). Schamber (1995) adds, "Information seekers live in a real world of time and space, a world in which they must make quick decisions"(p. 1).

Web sites created by teachers or instructors in educational institutions are also becoming important tools in education. Chandler (1998) did a survey study about students who used instructor created Web sites. She found that most of the students used the site heavily for doing homework assignments, checking instructor office hours, checking class schedules, reading lecture notes, and other educational activities (p. 6).

The Internet provides more options and a variety of services when students search for information or do schoolwork. Wilson (1997) questioned students in a survey about the reasons for using the Internet in their research for course assignments. Students answered, ranked by frequency of responses, that they used the Internet for the following reasons: as a convenience tool, for information purposes, as a library alternative, for other purposes, for the advantages of hypertext links, and use-related issues (p. 85).

Searching in the URL

Students have different techniques in searching for information, depending on their skills or knowledge, age, and educational background. The Internet is in constant change in its technological infrastructure and increases in the number of Web sites or services. As a result, users of the Internet also learn new information or techniques almost in parallel. In the 1990s, the Internet was not constructed on a graphical base, as it is in the year 2000. The introduction of the Mosaic browser and the transition to the WWW in 1994 marked an important shift in the development of the Internet. Skills of the users changed as the Internet developed. A significant phenomenon is the use of URL (uniform resource locator) in the browser that is used as the address for Web sites. Many commercial enterprises advertise their Web site and use the URL to attract users. Web site enterprises usually use an easy-to-remember URL in order to facilitate use, for example, www.music.com. Theoretically users will search for information in the URL field of the Web browser instead of using Internet search engines. For example, typing a query in the place of the URL of the Web browser. Wilson (1997) asked students about

the source of information when conducting a course research. Even in 1996-97, 14% reported typing in the URL. In addition, Wilson (1997) asked students how they learned the skills for using the Internet, and she found that the second most frequently cited statement was that they had learned to use the Internet on their own, or were self-taught. She added that students learned the skills through trial and error (p.88). Therefore, the Internet attracts many people to learn many new things and skills on their own and not necessarily in academic classes. .

Library Catalog

Time is an important factor that changes perceptions and behaviors, as well as the needs of many people. An example is the electronic library catalog. It is common for most academic libraries as well as other libraries to connect their database via the Internet, especially the electronic library catalog, also known as OPAC (Online Public Access Catalog). Before the 1990s OPAC, the electronic library catalog was not graphically interfaced and was based solely on the structure or principle of the regular card catalog. OPAC caused some problems for many users especially in the academic arena. Borgman (1996) discussed many of the disadvantages of online catalogs. For example, she argued that online catalog problems are "due to the remnants of the card catalog in its structure and a failure to design user interfaces based on the knowledge and skills of online catalogs users" (p. 494). It is no surprise that another study found how negative were the reactions of OPAC's users. Park (1986) conducted a survey study in 1986 with 25 gradate students. The study asked respondents to rate on a 4-point scale

their searching behavior and attitudes about different issues regarding their search for information from the university. When students were asked which source they consulted most at the university or public library, the card catalog came first; online bibliographic search services came sixth; and the online catalog came seventh, which was last on the list.

Currently, most electronic library catalogs are still based on the principles the card catalog; however, the interface has changed, with user-friendly graphical interface and more resources. Some academic libraries still have the traditional card catalogs. The online library catalog is often linked to other resources and databases at different libraries via the Internet, and Z93.50 standard is also utilized. In addition, more services have been added such as interlibrary loan, course-related materials, and advanced searching capabilities. On the other hand, the regular card catalog seems to be neglected increasingly due to its limitations. Therefore, there is a great chance the current study would find the majority of students preferring to use the electronic library catalog via the Internet rather than the regular card catalog.

Anxiety

Anxiety is considered a typical life experience for many students in education, especially for college students (Onwuegbuzie, 1997). Due to the pressure of educational requirements and work, many students feel anxious about finishing school assignments in a timely fashion. There are many reasons for anxiety among students, depending on the

circumstances and the students' characteristics. One important area that the research targeted is the students who seek information from the Internet and the types of anxieties they exhibit. Students who seek information for academic work usually begin with the library, which is considered very important for most students. Students also seek information from the Internet for many reasons, including educational information needs. A review of the literature shows many studies that investigated students' anxiety and their activities in the library, which usually concentrated on seeking information. However, research that investigated students' anxiety and their use of the Internet is limited due to the fact that the Internet started to flourish in the educational arena sometime after 1990s, after the introduction of the World Wide Web and the graphical interface when the Mosaic browser was introduced. This is all in contrast with the library, which has played a vital role for a long time.

Mellon (1986) conducted a qualitative study for 2 years about university students and their use of the library. He found that 75% to 85% of the students had expressed their initial searching of the library for information in terms of fears. These terms included "scary, overpowering, hopeless, confused and fear unknown appeared over and over again" (Mellon, 1986, p. 162). According to Mellon (1986), students felt that their library skills were not adequate, and they felt shy in expressing their inadequacy (p. 160).

There are many reasons or areas that cause anxiety for students who search the library for information, depending on situations or needs. Onwueghbuzie (2000) found in

a study of 135 graduate students a strong relationship between library anxiety and academic procrastination. According to Onwueghbuzie:

> Findings revealed that, overall, academic procrastination is significantly positively related to affective barriers, comfort with the library, and mechanical barriers. In addition, academic procrastination resulting from both fear of failure and task aversiveness appear to be related significantly to barriers with staff, affective barriers, comfort with the library, and knowledge of the library (2000, p. 50-51).

Onwuegbuzie (1997) also did a similar study but with students who were preparing a research proposal. In the 1997 study, he found many areas of anxiety that including anxiety among students, including several related to the library. Onwuegbuzie found that students had library anxiety related to interpersonal anxiety, perceived library competence, perceived comfort with the library, location anxiety, mechanical anxiety, and resource anxiety (p. 14). In addition, students were anxious about the size of the library, their lack of knowledge about material location, and their inability to know how to begin and what to do (p. 162).

Research has documented differences in anxiety levels between males and females and because of other personal characteristics. Burdick (1995) found some difference between males and females in the level of anxiety or feeling and information-seeking. Burdick studied 103 students from the upper level of high school doing research

in the library for school projects. Burdick applied the same research methodology used previously by Kuhlthau (1993) in the model of (ISP) information search process. Burdick's aim was to find the differences between males and females in the ISP. Burdick found that "Both males and females expressed confidence in equal numbers and with equal force, but with slightly different connotations" (p. 223). On the other hand, "females were twice as likely to express feelings of anxiety as males. They found the process stressful and talked about that stress" (p. 221). Burdick added:

> Differences in degree of focus formulation suggested that females may focus earlier in the process and perhaps more clearly. Males were more vague at midpoint in describing focus formulation, while females were more focused in their descriptions. This difference was not evident at closure. An additive measure indicated that females' thoughts were more focused in the aggregate. (p. 160)

Anxiety and the Internet

Presno (1998) reviewed the research on computer anxiety and applied it to students' anxiety with the Internet. The qualitative research methodology included observation, semi-structured interviews, unstructured interviews, and document analysis in order to achieve good study triangulation. The subjects of the study were 21 adult students who were taking an Internet class. Presno discerned four areas of Internet anxiety that were exhibited by the students. The development of the instrument for the present study utilized the conclusions of Presno's study in order to investigate the type of

anxieties students might have. The four areas of anxieties mentioned by Presno are described in (Table 1).

Table 1

A summary of the four areas of Internet anxiety by Presno (1998)

(1) Internet terminology Anxiety: Fear of Internet terminology, such as HTML, URLs and other terms or vocabulary words that are common in the Internet.	(*2) Net Search Anxiety:* Fear of not able to find what was sought due to Web problems such as Web pages that no longer exist or dead links or other technical problems that block access Web pages.
(3) Internet Time Delay Anxiety: Fear of taking very long time to access a Web page which later delay students from finishing their homework in the time	*(4) General Fear of Internet Failure:* A general fear of Internet failure and not being able to negotiate the Internet for doing homework assignment or other class tasks.

A study conducted by Zahner (1992) applied and used two constructs about academic library research; one was developed by Kuhlthau (1983, 1988a, 1988b), and the other was developed by Mellon (1986). These two studies investigated some aspects anxiety. Kuhlthau studied how students do research in the library and how many stages

they experienced, which she later called the six stages of information research process. Mellon's research focused on library anxiety when students search for information. Zahner (1992) used the two constructs for orienting students before doing the research in library, the traditional approach and cognitive strategies. The latter construct was newly developed and included the search process of Kuhlthau. Zahner found that newly developed instruction reduced the anxiety of students when they did research for their assignment.

Information Needs, A theoretical Perspective

In the review of literature, "information need" can be found with many definitions and interpretations. Investigators and writers have defined information need according to their philosophy or area of research. For example, Derr (1983) defined information need as "a condition in which certain information contributes to the achievement of genuine or legitimate information purpose" (273). According to Derr, "Information need is a relationship which obtains between information and information purpose: it is not a psychological state" (273). Derr (1983) found the purpose of information need as the objective of any research rather than the psychological state. On the other hand, other researchers have defined information need as a psychological state, but at the same time as a concept difficult to comprehend. For example, Cooper (1971) wrote, "The information itself is a psychological state, not visible or complex of symbols" (p. 21). Cooper (1971) added, "An information need is therefore something not directly observable; we cannot, for example see its structure" (p. 21). Saracevic (1975) agreed

with Cooper, adding, "information need is a psychological state associated with uncertainty, and with desire to know the unknown" (p. 331). Derr (1983) wrote, "The assumption that information need is a psychological condition perhaps has retarded researchers in this area since the difficulty of verifying psychological states of individuals is well known" (p. 176). There appear to be two point of views among researchers: one defines information need as a psychological state, and the other defines it as a condition or stage when searching for information and not necessarily as a psychological state.

In any case, both sides tend to agree on the objects of information need rather than the investigation of something difficult and exhaustive. It is common that most of the studies in information science, as well as in other disciplines, are aimed toward finding solutions for an existing problem. Krikelas (1983), for example, wrote, "It seems more useful … to define needs as recognition of existence of uncertainty and to observe the resolution (a behavior) rather than to require articulation of a relatively nebulous concept" (p. 8). Belkin (1982), has an idea or perhaps a theory about human seeking behavior calling it "Anomalous State Of Knowledge," (ASK). In defining information need and relating it to information-seeking behavior, Belkin noted the following: "The ASK hypothesis that an information need arises from a recognized anomaly in the user's state of knowledge concerning some topic or situation and that, in general, the user is unable to specify what is needed to resolve that anomaly" (p. 62). Belkin was interested in information retrieval (IR) that is text based, such as searching for documents in a library. Belkin (1982) argued that there are certain situations in which the user finds "his

state of knowledge inadequate for resolving that problem, and decides that obtaining information about the problem area and its circumstances is an appropriate means toward its resolution" (p. 63).

Another researcher who investigated users and their information-seeking is Dervin, (1986), who emphasized the role of communication in information-seeking. Dervin and colleagues developed the "Sense-Making Approach" approach to conceptualize information need and uses. Dervin argued that much of the research in information retrieval and user seeking behavior is devoted to the system approach and not the user approach. She argued for the user approach as the solution. In her argument, Dervin noted that, "information needs have not been defined as what users think they need but rather in terms that designate what it is in the information system that is needed" (p. 17). She defined information need as "a state needing anything the researcher called information" (p.17). Dervin, in relating to other researchers, also defined information need as " 1) a property of matter; 2) any message, document, or information resource; 3) any publicly available symbolic material; 4) any data" (p.17).

An earlier discussion of information needs is by Lipetz (1970) suggested just why contriving investigation of information seeking behavior is so important especially comment "C":

> The study of information needs and uses is a rational activity when viewed as a means to an end. The objectives of studying information needs and uses may be (a) the explanation of observed phenomena of information use or expressed need; or better yet, (b) the prediction of instances of information use; or, still better (c) the control, and thereby improvement, of the utilization of information through manipulation of essential conditions. (p. 3)

Chen (1982) investigated citizens' information needs and problems of 2,400 residents in the New England states in the United States in 1979. In interviews, the researcher asked respondents "to describe an important work or non-work related situation from the past month or so in which they made a decision, found an answer to a question, solved a problem, or tried to understand something" (p. 42). Respondents gave 3, 530 different types of situations in which work related situations and non-work situations were almost equal. According to Chen, the word information was avoided in his interviews in order not to make the respondents aware of the aim of the study (p. 25). Chen found the five most mentioned situations included the following: job-related technical; consumer issues; getting/changing jobs; housing and household maintenance; education and schooling (Chen, 1982, p. 42-43).

Information-Seeking Behavior

Information-seeking behavior is a difficult area in which to reach for just one conclusion because human beings are often different and unpredictable in their behavior. The behavior of human beings when they seek information is influenced by many factors, including but not limited to, human characteristics, situations, and interaction with information systems. In addition, the methodology of researching human information-seeking behavior can play a vital role and bring various results. There are two primary approaches in investigating the area of information systems. One is called the System-Centered approach and the other the User-Centered approach. The first concentrates on the system in the first place, such as information retrieval. The second places more emphasis on the users and their needs for information and the problems facing them. Kuhlthau's (1983) research on the information search process of students is a good example of a study that utilizes the User-Centered approach.

Models of Information-Seeking Behavior

Various researchers have investigated the information-seeking behaviors of users in different environments and circumstances. The following are some examples of different models. Hardy (1982) discussed two models when users seek information from source channels. His study concerned traditional channels, such as libraries or printed sources. The first model is the Cost/Benefit model; it concerns the seekers who "select information sources on the basis of expected benefits and expected costs" (p. 289). The second model is called the Least-Effort model; it concerns the users who seek

"information sources on the basis of minimizing the effort or cost in obtaining information, while even sacrificing the quality of the information" (p. 289). Hardy mentioned "ease of accessing information has greater importance to information seekers than the quality of information available" (p. 292).

In a similar way, a paper by Saracevic (1997) discussed user interaction with the information system, such as the computer and presented a model called the stratified model of IR interaction. He mentioned three levels of user behavior when interacting with a computer and when needing to retrieve information: the Cognitive level, the Affective level, and the Situational level (p. 317).

Ellis (1989) discussed the information-seeking behavior of academic social scientists at the University of Sheffield and presented a behavioral model that has been used by others such as Choo et al (1999) study. Ellis (1989) interviewed 16 subjects and recorded their inputs. His behavioral model identified six different activities common to the subjects of his study. These six activities are included in Table 2. Ellis concluded that it is possible to apply his model to information system design.

Table 2

Ellis' Model

1. Starting: activates characteristic of the initial search for information.
2. Chaining: following chains of citations or other forms of referential connection between material.
3. Browsing: semi-directed searching in an area of potential interest.
4. Differentiating: using differences between sources as filters on the nature and quality of material examined.
5. Monitoring: maintaining awareness of developments in the field through the monitoring of particular sources.
6. Extracting: systematically working through a particular source to locate material of interest.

(Ellis, 1989, p. 178)

Choo and others (1999) used the Ellis model of information-seeking behavior and combined it with other models or studies to investigate the information-seeking behavior of Web users. Choo et al studied the Web information-seeking behavior of 34 knowledge workers from seven companies, using interviews, Web tracking, and questionnaires. The knowledge workers included mangers, specialists, and researchers. Choo et al used the models of Aguilar (1967) and Daft and Weick (1984), which were about the modes of scanning. Mode of scanning includes the following activities: undirected viewing, conditional viewing, informal search, and formal search. Choo et al. described their new model in a table in two axes. On one axis was the Ellis model and on the other axis was the model of Aguilar (1967) and others. The study showed users' information-seeking behavior in 61 episodes including: 12 undirected viewing episodes, 18 conditional viewing, 23 informal search, and eight formal search.

Another study by Wolcott (1998) used the Ellis Model in conjunction with the Kuhlthau model of ISP as a guide or framework. A teacher and a librarian were introduced to the Kuhlthau model's six stages of the ISP and were asked to organize a timetable for the students (subjects of the study) according to the ISP. The study involved qualitative research method with four students from the seventh grade. The study investigated the information-seeking techniques of the students as they used the World Wide Web. Students were given an assignment and asked to search for information on the Web. Actions were recorded in the think-a loud protocol. Wolcott found that most students did browsing and differentiating most of the time and that the

patterns of the information-seeking behavior "were not necessarily linear in appearance, but cycled according to students interactions with the data" (Wolcott, 1998, p. 159). This result can be expected; even Kuhlthau (1993) mentioned that progress in the ISP it is not always linear. Also the size of the sample of Wolcott's study was small, with only four people. Wolcott also adds that students' characteristics, such as the students' knowledge, played a role in the patterns of information-seeking (p. 159).

Kuhlthau' Information Search Process Model (ISP)

Kuhlthau developed the model of information search process, (ISP), from different and continued works when she began her doctoral dissertation in 1983. The model describes the stages experienced by the subjects who searched for information in order to complete their assignments. Kuhlthau describes the actions, feelings, and thoughts of the user who searched for information, and presents six different stages experienced by the subjects during their search process, (see Table 3).

Table 3

Kuhlthau's Search Process Model

Stages in ISP	*Feelings Common to Each Stage*	*Thoughts Common to Each Stage*	*Actions Common to Each Stage*	*Appropriate Task*
1. *Initiation*	Uncertainty	General/Vague	Seeking Background Information	Recognize
2. *Selection*	Optimism			Identify
3. *Exploration*	Confusion/ Frustration/Doubt		Seeking Relevant Information	Investigate
4. *Formulation*	Clarity	Narrowed/Clearer		Formulate
5. *Collection*	Sense of Direction/ Confidence	Increased Interest	Seeking Relevant or Focused Information	Gather
6. *Presentation*	Relief/Satisfaction or Disappointment	Clearer or Focused		Complete

(Kuhlthau, 1991, p. 367)

Kuhlthau (1983) conducted a qualitative investigation with high school students. The aim was to study how students search for information when given an assignment and what problems they face. Study used different techniques to collect data that included timeline, journal search logs, flowchart, pieces of writing, and interviews (p. 131). From the study (1983), Kuhlthau concluded that students passed through into six different stages, each of which has a distinct nature. In the development of the ISP model, Kuhlthau based her work on different theoretical approaches from different areas including human cognition, psychology, education, and library science. The relationship of the theories of Kelly, Taylor, and Belkin provided a frame of reference for investigating users' experiences in the ISP, (see Table 4).

Table 4

Theoretical Foundation of ISP

1 *Phases of Construction* (Kelly)	2 *Levels of Need* (Taylor)	3 *Levels of Specificity* (Belkin)	4 *Expression* (Taylor, Belkin)	5 *Mood* (Kelly)
Confusion	Visceral	Anomalous State of		
Doubt	Conscious	Knowledge New Problem	Questions Connections	Invitational
Threat		Experiential		
Hypothesis Testing	Formal	Needs	Commands Gaps	Indicative
Assessing	Compromised	Defined Problem Well Understood		
Reconstruing		Situation Information Needs Coherent State of Knowledge		

(Kuhlthau, 1991, p. 363)

In subsequent works, Kuhlthau continued revising the model, including the research of 1990 in which the model was validated with different users and in different environments. The large scale study examined users in academic, school, and public libraries. According to the researchers, " the model holds in nearly all respects for a broad population of library users" (Kuhlthau et al, 1990, p. 6). According to Kuhlthau, the thoughts of the participants changed as they moved in the search process toward more clarity in their thinking and became focused in the final stage of the model (p. 6). Kuhlthau was confident that the model would hold in the Web environment and encouraged similar research in this area (Kuhlthau, personal communication, Feb., 2000). The information search process has six different stages, each of which has a unique task or behavior: Task Initiation, Topic Selection, Prefocus Exploration, Focus Formulation, Information Gathering, and Search Closure. Brief explanation of each stage follows:

(1) Task initiation is the stage in which a person becomes aware of a lack of knowledge and needs information to do a certain task or to complete an assignment. Users usually think about their need and try to recall their previous knowledge of the problem.

(2) Topic selection is the stage in which the person selects a general topic to be researched. He or she thinks over different topics and tries to select the one with the most potential for success and predicts the outcomes.

(3) Prefocus exploration is the stage in which the person now searches for information in order to find or extend understanding or find a focus.

(4) Focus formulation is the stage in which the person tries to find a focus from information or a better understanding from the information received.

(5) Information gathering is the stage in which the person collects information and knows where and how to search for information. It is the stage in which the interaction between the user and the information system function best.

(6) Search closure is the stage in which the person has enough information and prepares to present the information or use the finding. Users usually make a summary search and feel the need to stop searching for information due to time limitations. Users are noted at this stage to have a redundancy of information and less relevancy of information (Kuhlthau, 1990, 1991).

Numerous studies had employed the Kuhlthau model of the information search process with or without modifications in studying users, mostly students. For example, Friel (1995) did a study with low-achieving freshmen and found behaviors and outcomes very similar to Kuhlthau's model. Byron (1999) used Kuhlthau's model and employed it in a study with undergraduate and graduate students who were being given courses that used VCU (Virtual Collaborate University) software. VCU was software that enabled

students to access and exchange information from the Internet and the library, and to communicate with and pose questions to the instructors or other students. Byron used Kuhlthau's model and administrated the survey three times at the initiation, midpoint, and closure. Byron stated that her study brought results similar to Kuhlthau's research and anticipated outcomes. Byron's study showed most of the students had experienced or selected stage 5 (information gathering), at the initiation and the midpoint. At the closure, most had experienced category "other". Stage 3, called "to investigate information", was the second most selected by the subjects of the study in the initiation, midpoint, and closure.

Discussion

The study combined two models in order to learn about students' information seeking behavior and anxiety related to the Internet. Kuhlthau found in various works that users experienced six different stages when searching for information that related to their task. The six stages presented in the information search process (ISP) included task initiation, topic selection, prefocus exploration, focus formulation, information gathering, and search closure. Most studies used the ISP model three times, at initiation, midpoint, and closure. Kuhlthau (1993) discussed that the user would feel uncertain in the beginning of his search for information and that uncertainty would decrease till the users finish or reach the end of his information gathering and complete the task. Kuhlthau used 10 different adjectives, "confident, disappointed, frustrated, relieved, sure, confused, doubtful, optimistic, satisfied, and uncertain," that represented feelings in order to study

how users felt during their search process for information. The current study used the adjectives presented by Kuhlthau's model but this study analyzed them differently. The adjectives were separated into two categories of positive and negative and were compared with the six stages. Some of the feelings adjectives can be related to anxiety because users would select a negative adjective if they had anxiety. Therefore, another model was utilized in this study because it was related to anxiety. The model was proposed by Presno (1998), who found in her study four areas of Internet anxiety: Internet time delay anxiety, net search anxiety, Internet terminology anxiety, and general fear of the Internet.

The six stages of the information search was presented in this study in one snapshot and not three times as most researches had done. It can be useful to use the six stages of the ISP in one snapshot because it would decrease the reactivity effect especially if it was conducted with large and heterogeneous sample. Very few researchers used the ISP model in one snapshot. For example, Davis (1992) used the model without modifications once with the three groups of middle school students and three times with the target group. Bateman (1998) investigated information relevance of university students, and she tied the six stages of the ISP in order to learn if there were relationships between information relevance and the six stages. The new approach of Bateman presented the six stages in a linear fashion rather randomly as was done by most studies. She presented the six stages lined in a separate paper and accompanied each stages with a list of descriptive words. She found that most of the students had selected stage 5 followed by stage 6. The current study presented the six stages as linear, used

different wording, and incorporated the model of Internet anxiety in order investigate the information seeking behavior of the students of the Internet.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of the study was to learn about the information seeking behavior and usability of university students of the Internet. The study developed an instrument that included Kuhlthau's (1990) model of information search process (ISP), and Presno's (1998) model of Internet anxiety. The researcher attended to learn what types of search activities, such as searching for educational or personal information, were most conducted by the students. Another aim of this study was to learn which of the six stages of the ISP was experienced most by the students, how they felt, and to what level they experienced anxiety with the Internet. The other aim was to learn what were the preferred searching tools and everyday life information sources. The study developed an electronic Web survey and elicited university students via e-mails to participate in the study. The survey was posted on the Web for two weeks and 172 returns were analyzed with descriptive statistics, factor analyses, and graphical representations.

Population

The population of this research included the students of University of North Texas (UNT) who were enrolled during Fall 1999/2000. The following is a description of the total population according to The University of North Texas Fact Book: 1999-2000.

Table 5

UNT Population

Texas	US Citizens – 23,389	Permanent Residents – 557	Total 23,946 (90.4%)
Out-of-State	US Citizens – 1,253	Permanent Residents - 43	Total 1,296 (4.9%)
Non Resident Aliens			Total 1,255 (4.7%)
University Total			26,493 (100%)

Note. From the University of North Texas, Fact Book 1999/2000

The University of North Texas students population constitutes the following average ages: Undergraduate – 22.5, Graduate - 32.8, and the total student enrollment – 24.9. The gender of students of Fall 1999 consisted of 54.7% female and 45.3% male.

Sampling

The researcher obtained a list of e-mail addresses of all the students enrolled in the university of North Texas from the Registrar's Office with their permission. The list contained 15,720 e-mail addresses of students who have accounts with UNT electronic mail. A systematic sampling technique was used for the study. Systematic sampling is a method that approximates simple random sampling and it is performed by taking every *n*th name of the population (Krathwohl, 1988). The advantage of systematic sampling is

that it may be spread across the population more than simple random sampling (Sapsford, 1996). The researcher carefully analyzed the list of e-mail addresses to identify any existing periodicity, such as listing of the names in alphabetical order, and found none. The list that contained the 15,720 e-mails was divided by 3,000. Every 5th e-mail name was selected from the population list. The sample used for the study included 3,000 e-mail addresses.

Design and Data Analysis

This study involved a quantitative research design. The researcher used descriptive statistics to analyze the data in terms of frequency, central tendency, and graphic representation of the data. The researcher also used factor analysis to analyze the 13 variables from questions 1, 4, 9, and 10 from the Web survey because their scales were very similar. Content analysis was used to analyze the variables that were related to Internet activities and the academic majors of the respondents.

Limitation

The time period of the study was short and could not be extended due to institutional time limitations. The period of the study was November 14 to December 1 of 2000. This time period insured students would be engaged in course work. However, it also meant that students were very busy and might not have time to respond.

Assumptions

The assumptions of the this study were that the majority of the students use the Internet for many activities related to educational as well as personal needs. Therefore, the majority of students should have e-mail addresses. Another assumption was related to the information search process as proposed by Kuhlthau in which students usually received various topics from their instructors and were asked to search for information in order to solve problems. In this study, university students usually had many topics and needed to search for information in order to solve problems. The issue here was that these topics were not necessarily assigned by their instructors only; topics could also be related to personal need. Therefore, the students would experience the six stages of the information search process. Another assumption was that there was no need to survey the subjects three times, as was done in previous studies using the Kuhlthau model, because the population in this study was large and heterogeneous. Another assumption is those who have e-mail addresses represent the whole population, have more interest with the Internet, and whom responses were not self-selected.

Research Ethic

The survey and aim of the study were reviewed by the University of North Texas Institutional Review Board, and approval was granted for conducting the study (see Appendix E). The Web survey of the study contained a cover letter asking respondents to participate in the study and explained the nature of the study and time period for completing the survey, which was about 15 minutes or less (see Appendix F). The cover

letter also gave the respondents the choice to withdraw at any time without prejudice or penalty. All of the respondents participated in the study anonymously and without revealing personal information.

Instrument

The purpose of the study was to investigate and learn about students and their usage and information seeking of the Internet. The study analyzed the literature for areas of interest and gaps awaiting further research. The study tied the various areas that were related to the aim of the study. These areas included information search process according to Kuhlthau works, Internet anxiety based on research by Presno (1998), search engines, sources of information needs, usability of the Internet, and demographical information. The researcher analyzed studies that discussed related models of information seeking and concluded that the information search process would be suitable for this study because it was validated and tested many times over 10 years. The information search process was originally developed after studying the users of the library; therefore, changes were made in order use it in this study. The part that was used included the six stages of information search process and the feeling adjectives. Discussions with experts and associates in the field of information science, library, and information system design helped develop the final version instrument. The instrument was also field tested with students during the developmental process and comments and suggestions were considered.

The instrument used a part of Kuhlthau's Information Search Process survey (1993) in the construction of some questions. Kuhlthau used in her research adjectives that represent different possible feelings at each stage in the information search process. These adjectives include confidant, confused, disappointed, doubtful, frustrated, optimistic, relieved, satisfied, sure, and uncertain. The study used the feeling adjectives in the construction of question 8. In this study, question 5 was constructed using Kuhlthau's model but with the stages of the information search process explicitly stated in the survey questionnaire. Kuhlthau used different statements related to the information stages without mentioning the names of the stages of information search process. The current study used the stage names and provided a description for each of them. Subjects were asked to select one stage that represented their state during the study. The stages used in the survey are listed below.

Stage one: Task initiation (just recognized a need for information and thinking how to start and where to look)

Stage two: Topic selection (having different topics and trying to select or decide on which topic or selection to search for information)

Stage three: Early Exploration (searching for information in order to find a focus and understanding about a general topic that later will help gather more relevant information)

Stage four: Focused Formulation (trying to find a focus or understanding about your topic from information you got)

Stage five: Information Gathering (searching and collecting information extensively)

Stage six: Search Closure (having enough information and thinking about stopping the search for information and using the findings)

Question 9 in the survey questionnaire used the model from a study by Presno (1998) that found four areas of Internet anxieties experienced by the subjects of her study, who were college students: net search anxiety, Internet terminology anxiety, Internet time delay anxiety, and general fear of the Internet. The current study used these four areas of anxiety in the construction of four sub questions on a 7-point scale. The point 0 represented no anxiety and the point "6" represented high anxiety. The types of Internet anxiety listed in the survey are listed below.

Net Search Anxiety (worrying about web problems such as dead links or web pages not found
Internet Terminology Anxiety (don't understand HTML, URLs, FTP and other internet terms)
Internet Time Delay (taking a longer time to download or access web pages)
General fear of Internet failure (worrying about not utilizing Internet to complete homework assignment or other personal needs)

The remaining items of the survey instrument were developed from the poll items after relating them to the needs and purposes of the study. The survey instrument included question 1, which related to the searching for information or communicating activities of the students during the study. Other questions related to their urgency for information and their confidence in finding the information needed. Question 10 was related to their perceived skills of computers and Internet searching and use. Question 11 was related to perceptions of the university electronic catalog, regular card catalog,

information on the Internet, and the library. Questions 12 and 13 were related to the usability and uses of different tools over the Internet. Question 14 was related to the perceived primary source of information for everyday information needs. Questions 15 and 16 focused on the search engines. All of the previous instruments used a scale with 7 points, 5 points, 4 points, and 3 points. The rest of the instrument questions related to the background of the respondents. The questions used in the survey are described in the following (see Appendix 1).

Question 1 "During the last 14 days, what you have been doing on the Internet?" asked about the activities the students engaged during the study. Activities included searching for educational, personal information, communicating, and other activities.
A seven-point scale was used for this question in which "0" represented no activity and "6" represent maximum activity.

Question 2 was an open-ended question that intended to learn what other activities students might have engaged in during the study.

Question 3 was intended to enable students to skip to question 9 in case they answered "0" activity for both items related to searching for educational and personal information in Question 1.

Question 4 was intended to learn how much the students felt their information was urgent and how confident they were in finding their sought information. A seven-point scale was used for this question in which "0" represented low and "6" represented high.

Question 5 "People searching for information often go through different stages. Please indicate the one stage that best describes you at this point." asked the students to identify the stage they experienced during the study. Six stages of the information search process were listed in sequential order and each stage had description. The font was colored red to distinguish the stages from the accompanied description.

Question 6 "Do you feel experiencing more than one stage at the same time." was related to question 5

Question 7 was related to Question 6 and was intended to learn what combination of stages the students believed they experienced at the same time. The font was colored red for all of them.

Question 8 "In general, how do you feel at this point about your search for information from the web? Please select all that apply." was intended to learn about how the students felt during the study in their search for information. Ten feeling adjectives were listed.

Question 9 “Please tell whether you experience Internet anxiety in these areas:” asked about Internet anxiety in 4 areas. A seven-point scale was used for this question in which “0” represented none and “6” represented a lot.

Question 10 “How much skill do you fell you have with” asked about students’ perceived skills with computer and Internet searching and use. A seven-point scale was used for this question in which “0” represented none and “6” represented a lot.

Question 11 “Tell what you think about the following statements:” contained 9 different statements related to the Internet, library, information, and card catalog. It was intended to learn about students’ perceptions and consistency of their responses. A five point Likert scale, which included Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree, was used.

Question 12“How often do you use the following?” asked students about the 13 items related to Internet usability and university electronic library. A four point Likert scale, which included, Often, Sometimes, Rarely, and Never, was used.

Question 13 “When using a Web search engine or the university electronic library, how often do you use the following search tools?” asked students about usability of 11 searching tools. A four point Likert scale, which included: Often, Sometimes, Rarely, and Never, was used.

Question 14 “For your everyday life information needs, which do you think is most important?” asked students about their preferred source of everyday-life information need, which included TV, radio, Internet, newspapers, and libraries. A seven-point scale was used for this question in which “0” represented unimportant and “6” represented very important.

Question 15 asked students about search engines. A three point Likert scale, which included Yes, No, Not familiar was used.

Question 16 was related to Question 15 and intended to learn how students learned searching the Web browser designated URL address. “If you answered "yes" to the previous question (Do you sometimes enter a search query directly....), how did you learn about this technique for the first time?”

Question 17 and Question 18 were related to taking courses via the Internet. There were different multiple items to be selected.

Question 19 . "How did you learn the skill of using the Internet?" asked students how they learned the skills of using the Internet. Items listed included the school, friend or other people, self taught, and other

Question 20 asked students if they preferred reading long Web pages from the Internet or rather print them and read later.

Question 21 asked if students had a personal home page, and students could select from three items that included "yes", "no", and "considering."

Question 22 asked students how many hours per week they used the Internet. The numbers of hours listed were from 1 to 21 and up.

Questions 23 to 29 asked students about demographic information that included college major, workload, college status, gender, age, and citizenship.

Preliminary Investigation

The survey instrument was tested with associates in the field and friends to insure the understandability and clarity of the survey. The first version of the survey included an open space for suggestions and comments for every question item in the survey in order to revise and make necessarily changes. The researcher interviewed five people of the target population face-to-face and asked for their input and suggestions; phone conversations were also used. A revised version of the survey was sent to 15 associates though e-mails. The returned surveys were analyzed, and some pitfalls and problems were identified. Vague and long wording was identified and changes were made. The researcher noticed during the testing of the survey and from the conversations with subjects that they preferred reading one short sentence rather than of reading from a list. Therefore, Question 5, which was about the stages of the ISP, was changed according to the reactions and recommendations of the subjects. Some necessary changes and revisions for the final version of the survey were performed. The changes included altering the design of Question 1 and revising items in Question 11. Also, the color font of the items in Question 5 was changed to red color to distinguish and emphasize the stages from other text. Some words in Question 5 were changed to bold. The changes included the word 'for' in stage 3 and "from" in stage 4. Some items that had low reliability and or that took time answering the question were removed from the final survey.

Administration of the Study

This instrument was created as an electronic Web survey with forum responses returned to server. A Web site was created at the University of North Texas (see Appendix 1). The survey was posted and tested for proper operation. The Web survey was constructed in consultation with the university Web designer. The return data were saved at the Web site server as a text file and later were analyzed with SPSS statistical software. The subjects were asked to participate in the study by e-mail. Some 3,000 e-mail addresses were sent to the students of the University of North Texas and the study received 200 returns. The time period of the study was from November 14, 2000, to December 1, 2000.

Issues of Validity and Reliability

This survey instrument was considered to have content validity because it was based on published theoretical and field research studies, especially Kuhlthau and Presno. The instrument was considered to have face validity because it was field tested with different subjects both with interviews and self-administered methodologies. In addition, the survey and the purpose of the study were discussed with specialists and associates in the field. Question 11 in the survey questionnaire was designed purposely in order to validate the study. Question 11 has 6 items with reverse meanings and scorings, which aimed to test the consistency of respondents' answers. Question 11 was field tested and found to have high reliability of above .75. The survey was tested in the preliminary investigation for reliability with Cronbach Alpha reliability coefficient for most items and

was found to have scale reliability of .75 and above. Not all items, such as demographics questions, were appropriate or necessary for this measure.

CHAPTER 4

DATA ANALYSIS AND RESULTS

Introduction

The data analysis of the study is organized into various topics. Each topic represents a set of questions used on the electronic Web survey questionnaire (see Appendix A). These topics included response rate, background variables, usability, search engines, perceptions, Internet anxiety, Internet activities, information search stages and feelings, content analysis of question 2, and factor analysis.

Response Rate

The Web study began on November 14 and ended on December 1, 2000. The researcher sent 3,000 e-mail messages to the target sample, and 200 responses were received back. After cleaning errors and uncompleted responses, 178 returns were seemingly usable. Six responses were removed from the study for reasons to be discussed later in study analysis.

The Background Variables

The following is a discussion of information related to the respondents' background, which includes gender, age, citizenship, college status, workload, and education majors (see Table 6).

Table 6

The Background Variables

		Frequency	Percentage
Gender			
	Male	80	46%
	Female	92	53%
	Total	172	
Age			
	17-25	106	61%
	26-30	24	14%
	31-35	17	9.9%
	36-40	8	4.7%
	41 -up	17	9.90%
	Total	172	
College status			
	Freshman	15	8.7%
	Sophomore	14	8%
	Junior	23	13%
	Senior	58	33.7%
	Master	35	20%
	PhD/Higher	27	15.7%
	Total	172	
Work load			
	Full time	138	80%
	Part time	21	12%
	Part time Evening classes only	12	7%
	Total	171	

The researcher found that more females responded to the study than males in approximate reflection of the male and female ration of UNT student population. A total of 92 females and 80 males responded to the study. All of the age ranges in the study responded, but to varying degrees. Those who responded most frequently were the young students in the age range between 17-25, which represented 61% of all respondents. Next were the students in the age range between 26-30, which was 14% of all the respondents. The lowest response rate includes those in the age range 36-40. The results showed 98.8 of the students who responded to question 29 indicated they are American, with frequency of 170. Only 2 students indicated that they are international; somewhat less than the ratio of the international students in the population, which was 4.7.

The questionnaire asked the respondents about their college status or level. The undergraduate students numbering approximately 60% of all of the respondents constituted the majority in this study. The 58 senior students represented the highest frequency, 33.7 % of the respondents.

Most respondents indicated that they are full-time students. Their frequency was 138 students or 80% of the respondents. The part time students numbered 21, which was 12% of the respondents. Students in part time evening classes numbered 12, which was 7% of the respondents.

The respondents were asked about their educational majors on question 23. The educational majors of the students were sorted according to the schools and colleges of the University of North Texas. The study found that a majority of the respondents was enrolled in to the College of Arts and Sciences, with a frequency of 78 students and 47.9% of all the respondents. Next were the students who were in the College of Business Administration, with a frequency of 26 students. The smallest group included the students who are in to the School of Merchandising & Hospitality Management. Their frequency was 4 students and 2.5% of all the respondents. Three students responded with "undecided" concerning their educational major. Another 3 students entered responses that were unclear, and 3 other students omitted this part (see Table 7).

Table 7

Respondents' Educational Background

UNT Students (# of population)	Frequency of respondents	%
Arts and Sciences (9,635)	78	47.9
Business Administration (5,504)	26	16.0
Education (4,091)	21	12.9
Visual Arts (1,912)	12	7.4
Music (1,431)	9	5.5
Library and Information Sciences (361)	7	4.3
Community Service (1,841)	6	3.7
Merchandising & Hospitality management (436)	4	2.5
TAMS (372)	0	0
Graduate (910)	0	0
Total (26,493)	163	100.

Note. Left column represents the population at UNT

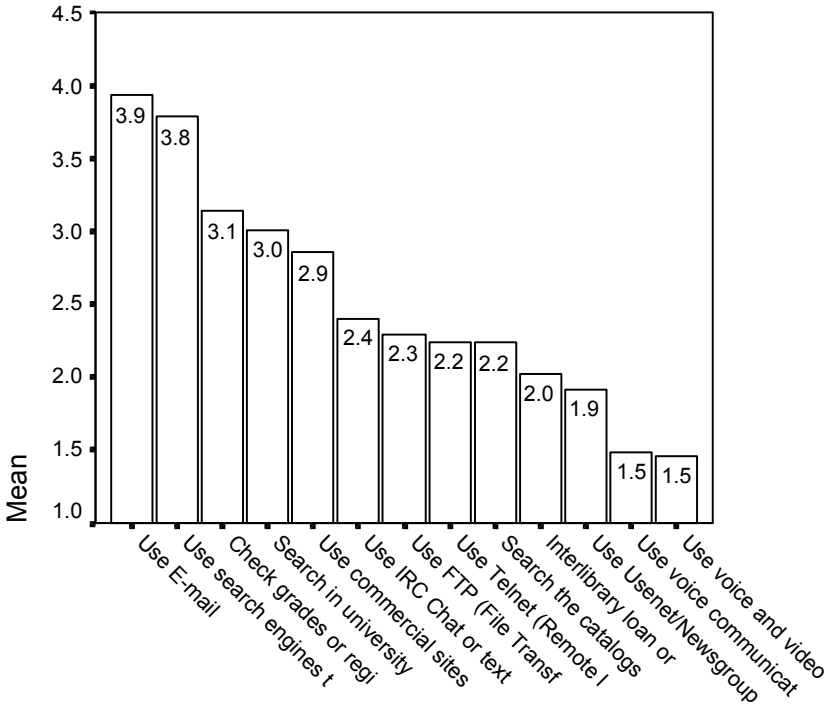
The right columns represent the responses of the sample combining both graduates and undergraduates.

Usability

Question 12 asked students about various activities related to the Internet. The survey asked respondents to rate their activities on the scale for each question-item with one of the following: often, sometimes, rarely, and never. The scale was rated with values from 1 to 4, with often represented by 4. Therefore, a higher mean value suggested more usage by students. The following activities were used more than other activities: use E-mail, use search engines to search for information on the Internet, check grades or register online, search in university online catalog via Internet, use commercial sites such as Amazon or Barnes & Noble. The students used two activities less significantly than others: use of voice communication and use of voice and video communication (see Figure 1).

Figure 1

Question 12, Usability

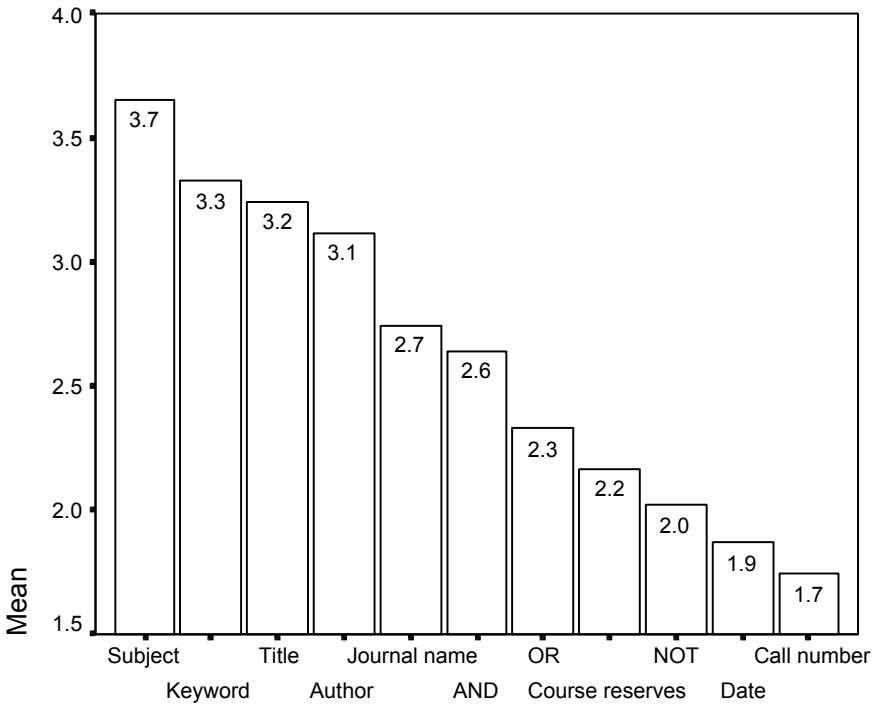


The mean values or each activity in the question were compared between males and females. Data showed that they had similar perceptions in regard to question 12. Small differences existed but were not significant, except for the item "use FTP" (file transfer protocol). Males gave a higher value for the item related to FTP. The mean value was 2.7 for males and 1.9 for females. That suggests that males tend to use FTP (file transfer protocol) more than females.

Question 13 examined which tool was preferred or used by students when they searched for information, using either the Internet or the university electronic library. The result showed that the search tool "subject" was preferred by respondents and received the highest mean value on the scale. The next search tools, in a subsequent order, were keyword, title, author, and journal name. The least preferred or used search tools were date and call number (see Figure 2).

Figure 2

Question 13, Usability



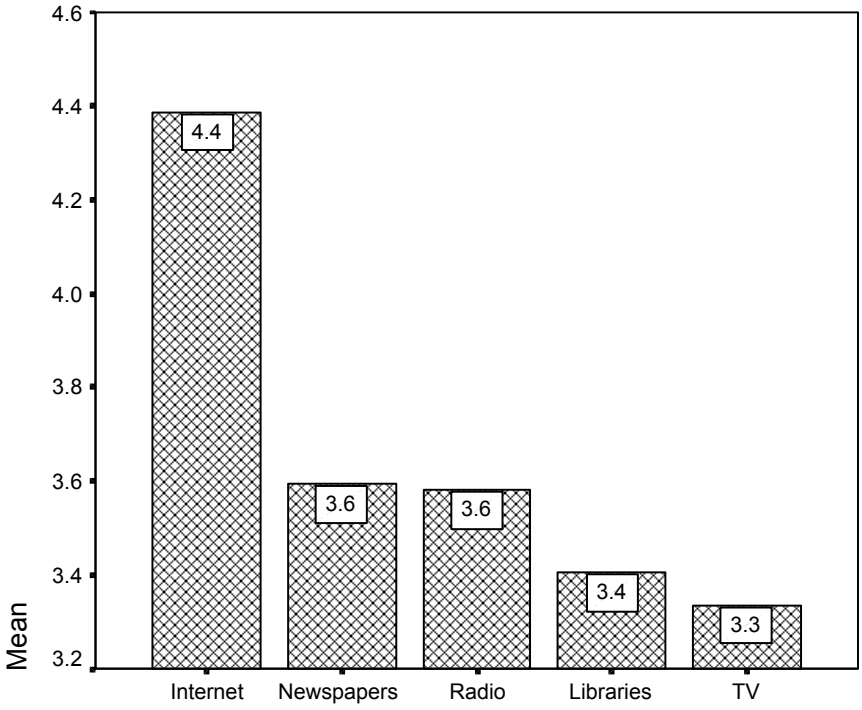
A comparison of the gender of the respondents was made for question 13. No significant differences between the males and the females were found according to the responses in this question. The mean values of the total values were very close, which indicates that males and females perceived the items in question 13 almost equally.

The age range of the respondents was also compared for responses to question 13, and some variations existed between the age ranges of the respondents. The difference was small, except the item related to journal name. Older students tended to use or search under journal name more than younger students.

Question 14 is a general question intended to find what most of the students think about the importance of the informational sources of everyday-life information needs. The question asked students to indicate responses on a seven-point scale in which 0 represented unimportant and 6 represented very important. The items included the following: TV, radio, Internet, newspapers, and libraries. Results showed that the Internet was perceived as the highest, with a mean of 4.40 and TV was perceived as the lowest with a mean of 3.35. Also, the standard deviation of the Internet was lowest, with a 1.44, and the highest standard deviation was newspapers, which received 1.86 (see Figure 3).

Figure 3

Question 14, Everyday-life Information Sources



Question 14 was also analyzed with the results of other independent variables including age, gender, and hours spent weekly using the Internet. Comparison of the age factor with the mean value related to the Internet showed that younger students, between 17-35, tended to perceive the Internet as more important than did older students. On the other hand, older students tended to perceive the library as more important than did younger students. The mean values of the variables that included TV, radio, and

newspapers showed small differences concerning the age ranges of the respondents (see Appendix C).

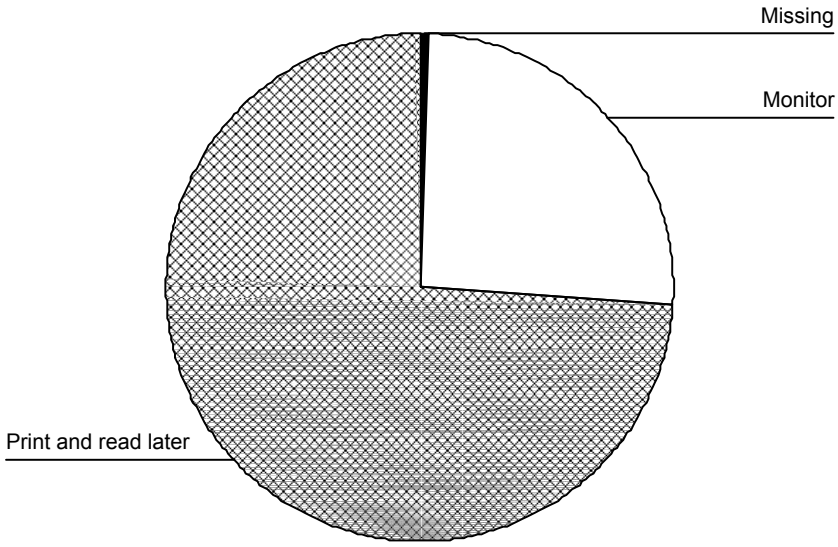
Concerning question 14 and the gender of the respondents, some differences existed. Both males and females perceived the Internet as more important than TV, radio, newspapers, and libraries. However, males tended to perceive TV, radio, newspapers, and libraries as being of almost equal importance. Females' reactions were higher than males, in that they assigned a higher value on the scale in regard to the importance of all the items (see Appendix D).

The mean values of question 14 were compared with those of question 22, which concerned the hours students spent per week using the Internet. Result showed a sharp and a systematic pattern in which students who spend a longer time using the Internet would also tend to perceive the Internet as more important than those who spend a shorter time using the Internet (see Appendix B).

Question 20 on the survey asked students what they preferred when reading long Web texts from the Web. The majority responded that they preferred printing long Web pages and reading them later: 73.8 of students selected "print and read later", and 24.7% selected "monitor" (see Figure 4).

Figure 4

Question 20, Reading from the Web



The purpose of question 21 was to find how many students have a personal homepage on the Web. Some 37.2% of the students indicated in the survey that they have a personal homepage; 48.3% indicated that they do not have a personal homepage; and 14.5% indicated that they were considering it.

Search engines

Questions 15 and 16 concerned students and their use of the search engines on the Internet. Data analysis showed that most of the students used search engines in that 97.1% answered "yes" and approximately 8 % answered either "no" or "not familiar." Data also showed that 62.2% of the students answered "yes" to "use meta/multi search engines" and 28% answered "not familiar" with "use meta/multi search engines." However, most of the students selected either "no" or "not familiar" to question 15_3, which was about search engines that use a software program. The percentage of students who answered "yes" was only 13%. Question 15_4 showed that most of the students do enter a search query directly in the URL address of the Web browser. The percentage of those who answered "yes" to question 15_4 was 77.3% (see Table 8). A comparison of question 15 concerning age and gender factors showed some variations, but in general they behaved similarly, or their perceptions were similar.

Table 8

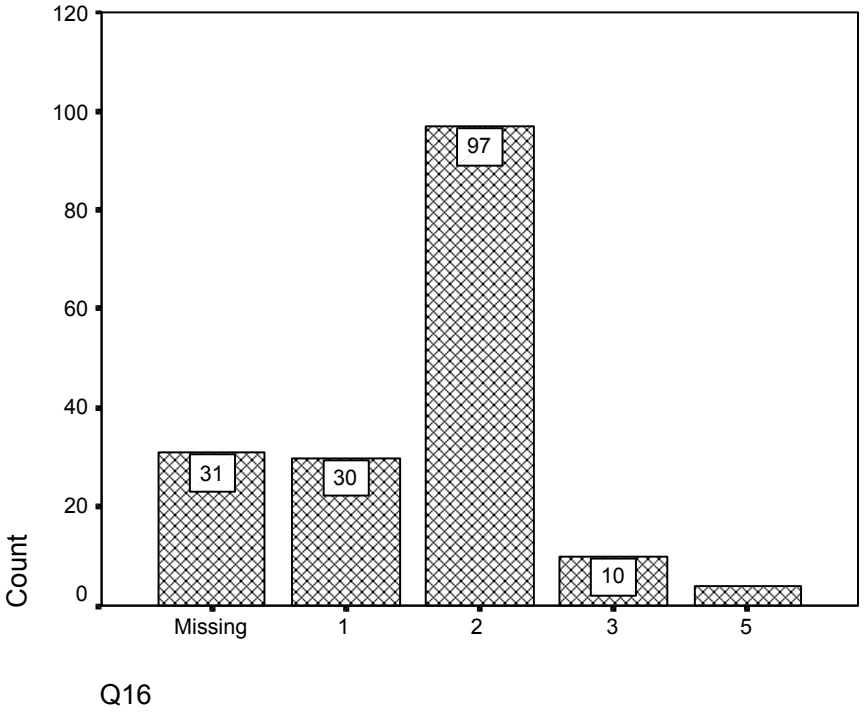
Question 15, Search Engines

Questions	Yes	No	Not familiar
Q15_1. Do you use search engines?	97.1%	.6%	2.3%
Q15_2. Do you use meta/multi search engines?	62.2%	9.3%	28.5%
Q15_3. Do you use meta/multi search engines with a software program?	13.4%	47.1%	39%
Q15_4. Do you sometimes enter a search query directly in the address place of the web browser, such as for example: http://www.music.com	77.3%	16.9%	5.8

Question 16 is related to question 15_4 "Do you sometimes enter a search query directly in the address place of the Web browser, such as for example: http://www.music.com." The aim was to learn how students learned the technique of directly typing in the URL address of the browser for the first time. Five selections were presented: someone told me, self-learning, coincidence, advertisement, and others. Results showed that the majority selected "self-learning," or 56.4% of all of the respondents, and "someone told me" were 17.4% of all the respondents. Given the large number of print and television advertisements listing URLs, it was surprising to find that none of the respondents selected "advertisement" (see Figure 5). A comparison of question 16 with gender factor showed that males and females selected "self learning" almost equally. The difference is that the number of females who selected someone told me was larger than the number of males. Also more females selected coincidence more than did the males (see Appendix H).

Figure 5

Question 16, Search Engines



Note.

(1) Someone told me (17.4%); (2) Self learning (56.4%)

(3) Coincidence (5.8%); (4) Advertisement, no one selected this item

(5) Others (2.3%)

The total number of the respondents who answered question 16 was 141. The system missing values was 31.

Perceptions

Question 10 sought to examine at the time of the study how much skill the students felt they had with computers and Internet searching and use. A seven-point scale was used. The results of the data analysis showed that the mean value was 4.53 for computers and 4.60 for Internet searching and use. This indicates that most of the respondents felt they had at least adequate skills with computers and Internet searching and use almost equally (see Table 10). A comparison of question 10 with the gender factor showed some differences in the perception between males and females in which males gave little higher values for both items than females. The mean values for male respondents were 4.7 in regard to computers and 4.8 for Internet searching and use. The mean values for female respondents were 4.4 in regard to computers and 4.5 in regard to Internet searching and use. Another difference was found when responses were compared with the age factor that had an almost systematic pattern. Results showed that younger respondents, age 17-25, gave low values for question 10, and the older the respondents the higher the values given till the age of 31-35. After age 35, the values started to decline (see Figure 6). This indicates that younger students believe that they have lower skills with computers and Internet searching and use than do older students.

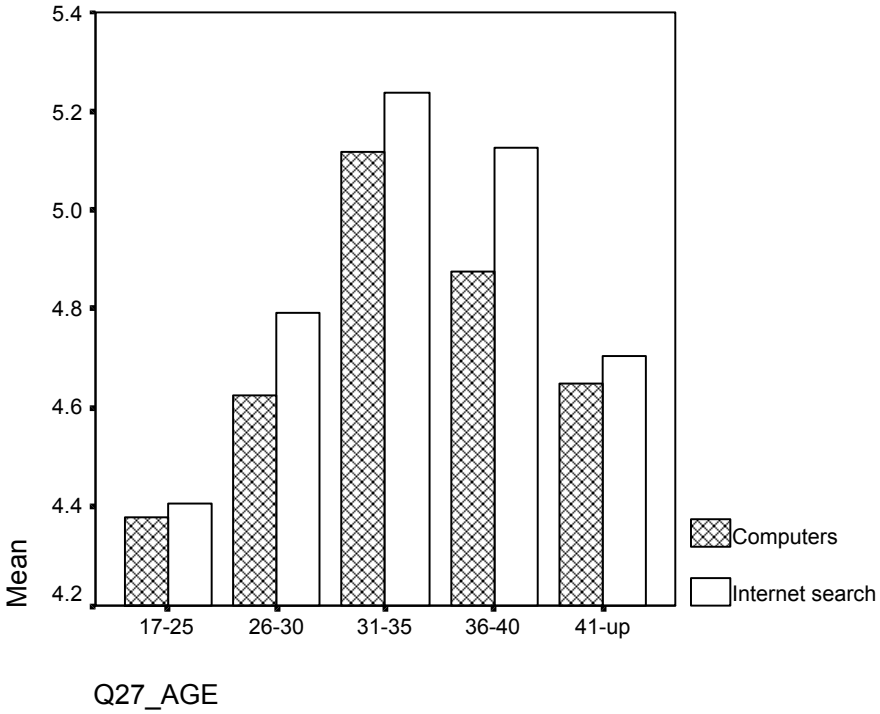
Table 9

Question 10, Perceptions of Skills

		Computers	Internet search
N	Valid	172	172
	Missing	0	0
Mean		4.53	4.60
Median		5.00	5.00
Mode		5	6
Std. Deviation		1.25	1.26
Skewness		-.629	-.764
Std. Error of Skewness		.185	.185
Kurtosis		-.104	.310
Std. Error of Kurtosis		.368	.368
Sum		780	792

Figure 6

Question 10, Perceptions of Skills by Age



Question 11 contained several statements in which three pairs of statements had opposite meanings and with values in reverse scoring (see Table 9). The aim was to examine the consistency of respondents' answers and to validate the study. Tests of scale reliability with SPSS of the items (questions 11_1, 11_2, 11_4, 11_5, 11_6, and 11_8) in question 11 yielded a high reliability of approximately Alpha .8. In addition, a test of Pearson correlations (Bivariate, two-tailed) with SPSS between each pair related was performed and found to be good. From the total respondents, only 6 gave inconsistent

answers for question 11; these inputs were removed in order not to affect the study. The three pairs of questions with opposite meanings are listed below accompanied by the Pearson correlation scores.

Question11_1 and question11_4	(a correlation of .695 at the 0.01 level)
Question11_2 and question11_5	(a correlation of .828 at the 0.01 level)
Question11_6 and question11_8	(a correlation of .604 at the 0.01 level)

The majority of respondents, 78%, strongly agreed or agreed that they could find information from the Web faster than searching the library. Also, 45% disagreed that finding information in the library is faster than searching the Web. However, 28% held neutral views for the last statement.

The respondents held mixed views concerning whether the Internet has more information than the library does in Q11_2, but the tendency was toward the Internet having more information. On the other hand, among the respondents, 33% strongly-disagreed and 33% disagreed that the library has more information than does the Internet.

Most of the respondents, about 90%, preferred using the university online or electronic catalog rather than using the regular card catalog. Only 9% preferred using the regular card catalog. About 90% strongly agreed and agreed that the Internet is useful for their education. About 70% strongly agreed or agreed that they preferred searching the Internet first, then the library for information. About 80% would prefer doing an electronic online survey to doing a paper-and-pencil survey (see Table 10).

Table 10

Question 11, Perceptions

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Question11_1 I can find information from the Web faster than searching the library	37%	41.3%	11.6%	8.6%	1.7%
Question11_2 The Internet has more information than the library does	15.1%	26.7%	35.5%	18.0%	4.7%
Question11_3 The Internet is useful for my education	44.8%	46.5%	5.8%	1.7%	0.6%
Question11_4 Finding information in the library is faster than searching the Web	1.7%	9.3%	28.5%	45.9%	14%
Question11_5 The library has more information than the Internet does	4.1%	17.4%	37.2%	33.7%	33.7%
Question11_6 I would rather use the university online or electronic catalog than the regular library card catalog	64%	23.3%	6.4%	4.7%	1.7%
Question11_7 I prefer searching the Internet first, then the library for information	30.2%	39.5%	18.0%	10.5%	1.7%
Question11_8 I prefer using library card catalog than university online catalog	0.6%	3.5%	9.3%	41.9%	44.8%
Question11_9 In the future, I would rather do an electronic online survey than a paper and pencil survey	39.5%	36.0%	18.0%	4.1%	1.7%

Question 17 showed that most of the students had not taken any courses concerning the Internet. Respondents who selected "no" represented 75 % of the total responses. The percentage of who selected "Yes" represented only 25 % of the total respondents.

Question 18 in the survey asked students what they preferred when taking academic courses. The choices were the Internet, regular classes, and either. Most of the respondents, 65.1 %, selected regular classes. Thirty percent of the respondents selected the category "either." However, few selected the Internet as a preference when taking academic courses. Those selecting the Internet represented only 4.7 % of the total respondents.

Of those who preferred taking academic courses via the Internet most were younger students of the age range between 17-25: the frequency was five students on 62.5% of all students who preferred the Internet. Full time students represented 87.5% with a frequency of seven and part time represented 12% with a frequency of one.

Question 19 in the survey asked students how they learned the skills of using the Internet. The majority responded that they were self-taught. A significant percentage of 72.2 % responded to "self-taught". Only 11.6 % respondents selected "school", and 12.2 % selected "friend or other people."

Internet Anxiety

Question 9 sought to examine whether students experience any anxiety with the Internet. The survey asked the respondents on question 9 to rate on a scale of seven points if they experienced anxieties in four areas: net search anxiety, Internet terminology anxiety, Internet time delay anxiety, and general fear of Internet failure. A description of each of the four areas was added to explain what each of these anxieties means.

The data analysis showed that students have anxiety with "Internet time delay" more than the other three categories. The mean value of Internet time delay anxiety was 3.08, and the mode value was 3. Thus, Internet time delay is a very significant form of anxiety. The other three categories of anxieties (Net search anxiety, Internet terminology, and general fear of Internet failure) showed very small mean values, as follows: net search anxiety, 1.74; Internet terminology anxiety, 1.12; and general fear of Internet failure, 1.32. This indicates that students did not worry much about the last three anxieties (see Table 11).

There is a rather significant difference between the males and females in regard to anxiety of the Internet (see Figure 7). The results showed that females in general scored higher values for Internet anxiety than males. In all of the areas of Internet anxieties, females responded to have anxieties that were higher than males especially the anxiety related to the Internet terminology. The data showed that females were almost twice as

anxious as males with Internet terminology. On the other hand, data showed that both sexes were nearly equal in regard to Internet time delay anxiety.

Table 11

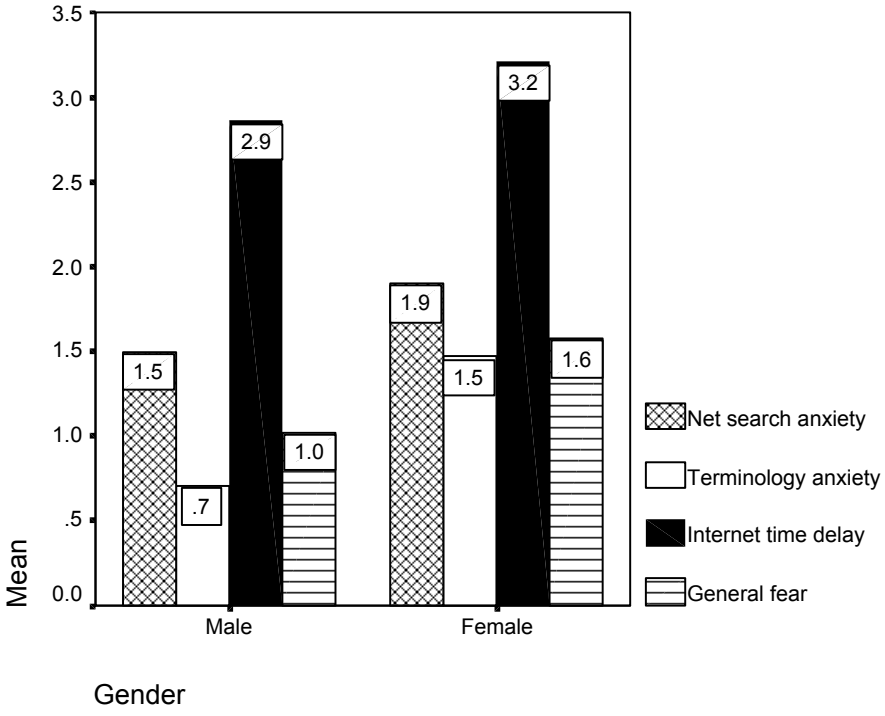
Question 9, Internet Anxiety

Internet Axiety

		Net search anxiety	Terminology anxiety	Internet time delay	General fear
N	Valid	171	170	172	170
	Missing	1	2	0	2
Mean		1.74	1.12	3.08	1.32
Median		1.00	.00	3.00	1.00
Mode		0	0	3	0
Std. Deviation		1.69	1.60	1.88	1.71
Variance		2.86	2.57	3.53	2.93
Skewness		.839	1.615	-.001	1.175
Std. Error of Skewness		.186	.186	.185	.186
Kurtosis		-.164	1.872	-1.121	.189
Std. Error of Kurtosis		.369	.370	.368	.370
Sum		298	190	530	225

Figure 7

Question 9, Internet Anxiety by Gender

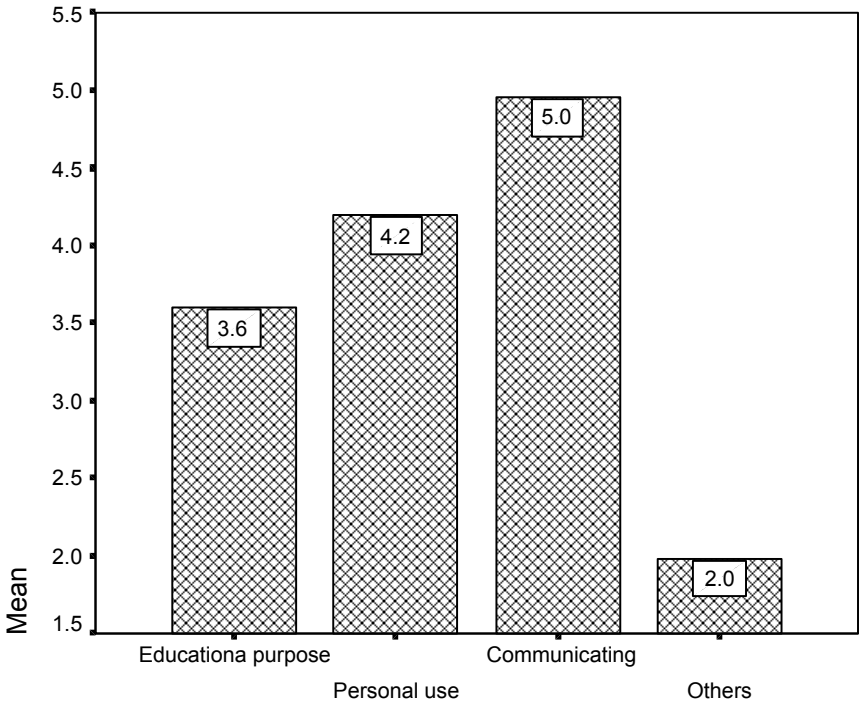


Internet Activities

Question 1 asked respondents on the Internet what they had been doing during the last 14 days. Four sub-questions asked if they had been searching for information for educational purposes, personal use, communicating, and other (see Appendix A). The 4 sub-questions were analyzed by taking the mean value for each of the seven-point scales for each sub-question and comparing it with the others. Analysis of the data showed that the question related to communication scored a higher mean value of five,

more than the other items. Searching for information related to personal use ranked second, and searching for information related to education purposes ranked third. The fourth, which was labeled "other," ranked fourth (see Figure 8).

Figure 8



A frequency analysis of sub-question 1, related to communication showed the majority of respondents selected a point on the seven-point scale from 1 to 6 and only one respondent selected a 0 point on the scale of a total of 171 responses. Eighty-six percent of the total respondents, who marked communication scale, selected a point on the scale from 4 to 6.

For the sub-question related to "searching for information for personal use," result showed only three respondents selected a 0 point on the scale. Of the total respondents, 67.4% selected a point on the scale from 4 to 6.

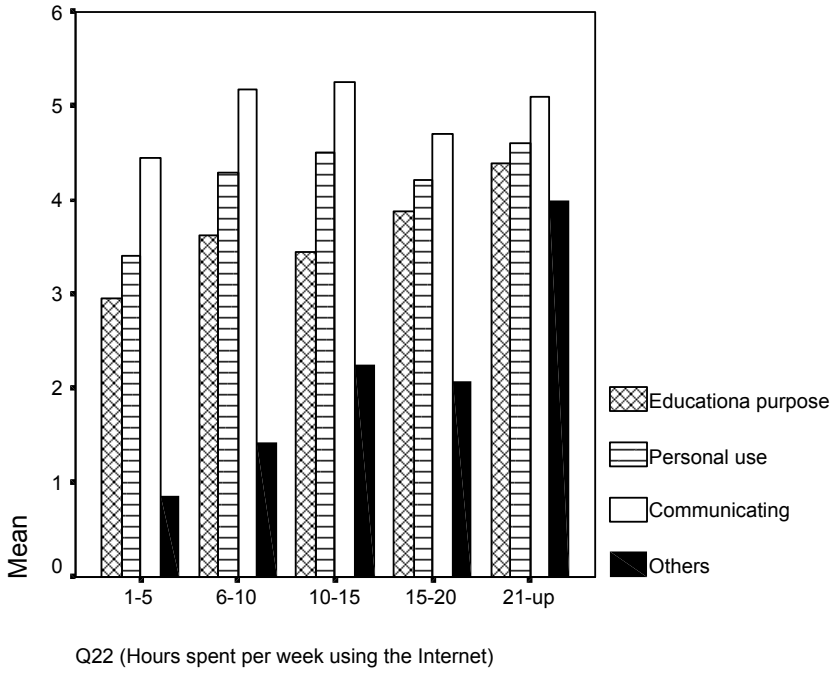
For the sub-question related to "searching for information for educational purposes," results showed that 15 respondents selected a 0 point on the scale. Of the total respondents who marked the education scale, 59.3% selected a point on the scale from 4 to 6.

It can be concluded that students use communications such as e-mail on the Internet more than other activities and that they search for personal use more than for information related to educational purposes. The mean values of question 1 were compared with the independent variable related to gender. Results showed no significant differences between males and females with regard to question 1.

A comparison between the mean values of question 1 and the ages of the respondents showed some variations among the groups, but with no particular pattern. However, when the mean values of question 1 were compared with question 22, which concerned the number of hours spent weekly by students using the Internet, a systematic pattern was revealed. It was found that the more hours students spent using the Internet weekly, the more activities done with the Internet, especially the category "other uses" (see Figure 9). Also, the category related to searching for information for educational purposes had a systematic increase. Therefore, there is a relation between students who spent many hours using the Internet and a higher activity using the Internet as Figure 9 showed.

Figure 9

Question 1, Internet Activities by hourly usage per week



Question 3 was to enable respondents who had had no activities in searching for information for either educational or personal purposes to omit questions that did not apply. The majority did not respond to question 3: "I selected no search activity for educational or personal use." Only five responded to question 3 and 167 did not. This

indicates that the majority of students engage in various activities related to searching for information from the Internet for different reasons.

Question 4 was posed to investigate whether there is a relation between the urgency of information and the confidence in finding the information from the Internet. Analysis showed that the majority of the respondents tended to give a higher weight to both by selecting the high-scale point, and very few gave a smaller weight (see Table 12).

Table 12

Question 4, Information Urgency and Finding Confidence

Question 4

		Information urgency	Information finding confidence
N	Valid	167	167
	Missing	5	5
Mean		4.23	4.39
Mode		6	5
Std. Deviation		1.52	1.30

The information Search Stages and Feelings

Question 5 investigated the six stages of the information search process, based on the Kuhlthau's model to learn whether there is a pattern or other unique behaviors. The respondents were asked to select the stage that best represented them at the time of the study. This portion of the study was intended to relate the six stages of the information search process by students to the Internet either for educational information needs or for personal information needs.

The number of respondents who answered question 5 was 165. The results showed most of the students had selected stage 5, which was 41 % of all of respondents. Stage 3 was next, which was 21 % of all respondents. Stage 1 was least selected, with only four respondents selecting it (see Table 13). There were some insignificant variations between males and females in regard to the information stages but in general it seems that they behave similarly (see Figure 10). In response to question 6, result showed 72% of the respondents indicated experiencing more than one stage at the same time. In response to question 7, the number of stages experienced at the same time was analyzed and found that 2 and 3 stages were most indicated by the respondents (see Table 14). Stage 1 and stage 2 were most correlated which indicate that they were selected together by most respondents; however, very few students selected them (see Appendix J). For question 7, the majority of students had selected stage 3, 4, and 5.

In conclusion, results showed that stage 1, 2 were not representing the real situation or experience of most subjects of this study. Even though stage 1 and 2 were correlated as

shown in Appendix J more than other stages, researcher speculates the reason is because they might have confused the subjects and did not reflect their actual experience. Therefore, further research is needed to refine and develop stage 1 and 2 or to exclude them.

Table 13

Question 5, Stages

Stages

		Frequency	Percent	Cumulative Percent
Valid	Stage 1	4	2.3	2.4
	Stage 2	10	5.8	8.5
	Stage 3	36	20.9	30.3
	Stage 4	22	12.8	43.6
	Stage 5	71	41.3	86.7
	Stage 6	22	12.8	100.0
	Total	165	95.9	
Missing	System	7	4.1	
Total		172	100.0	

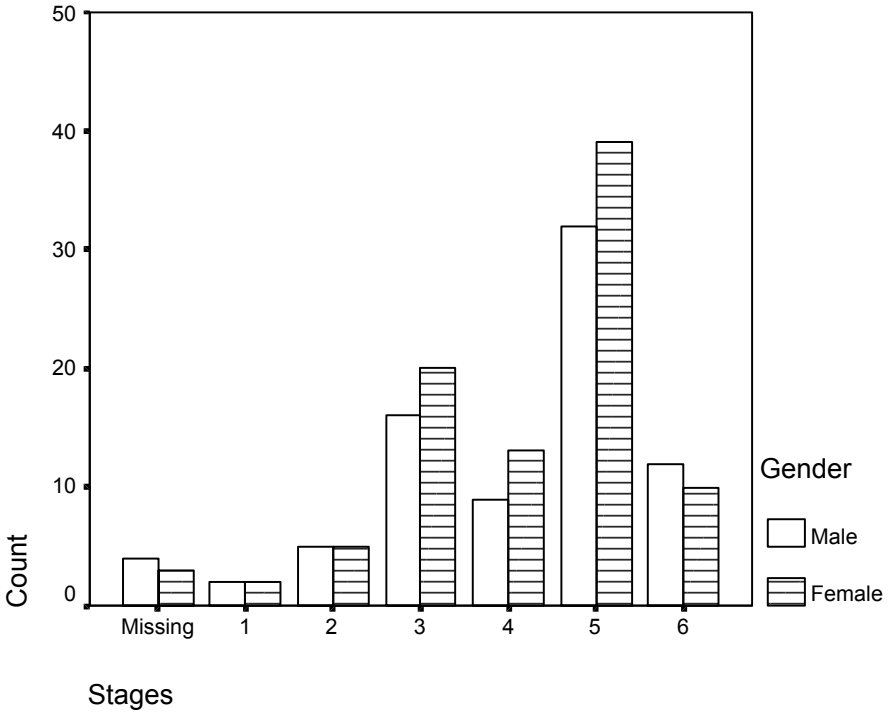
Table 14

Question 7, Number of Stages Experienced at the Same Time

	The number of stages experienced at the same time	Frequency	Percent
	0	48	27.9
	1	10	5.8
	2	45	26.2
	3	47	27.3
	4	13	7.6
	5	2	1.2
	6	7	4.1
	Total	172	100.0

Figure 10

Question 5, Information Stages by Gender



Question 8 was posed to analyze the feelings of the respondents in general in order to learn whether there is a relationship between the searching for information from the Internet and other variables in the survey such as the stages of information seeking. The feeling adjective words were analyzed into positive and negative. Question 8 was adapted from a study by Kuhlthau and others, which targeted users' activities in libraries (Kuhlthau, 1990, p. 15). The adjectives that represent positive feelings included: confident, optimistic, relieved, satisfied, and sure. The adjectives that represent negative

feelings included: confused, disappointed, doubtful, frustrated, and uncertain. Respondents were asked to select adjectives about how they felt in general at this point about their search for information from the Web. Respondents could select more than one adjective for question 8 (see Table 15 and Figure 11). Table 15 and Figure 11 shows the frequency of selected adjectives by the respondents of this study.

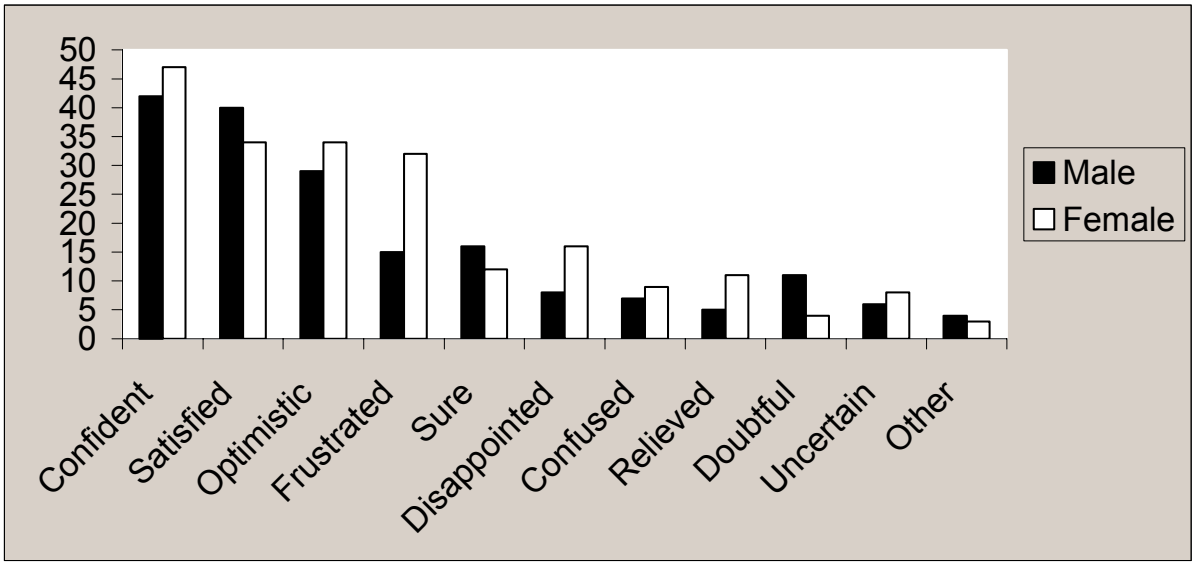
Table 15

Question 8, Frequency of Selected Feeling Adjectives by Gender

	Gender		Total
	Male	Female	
Confident	40	47	87
Satisfied	39	34	73
Optimistic	29	34	63
Frustrated	15	32	47
Sure	16	12	28
Disappointed	7	16	23
Confused	7	9	16
Relieved	5	11	16
Doubtful	11	4	15
Uncertain	6	8	14
Other	4	3	7

Figure 11

Question 8, Feeling Adjectives by Gender



As illustrated in Figure 11 and Table 15, the adjective confident was most selected by both male and female respondents. The difference is that females selected the adjectives frustrated, disappointed, and relieved more than males. Males, on the other hand selected the adjective doubtful more than females (see Table 15 and Figure 11). Ninety-two females and 80 males responded in this study.

Question 8 was also analyzed by organizing the adjectives in the SPSS datum into positive and negative. Then the total number of the selected negative and positive adjectives was analyzed for each subject to learn what the respondents had selected most in each stage of the six stages of their information seeking that corresponded to question 5 (see Table 16 and Figure 12).

Table 16

Adjectives by Stages

Stages	One	Two	Three	Four	Five	Six	Total
Confident	1	5	18	13	37	13	87
Confused	2	1	5	5	3		16
Disappointed	1	2	4	4	10	2	23
Doubtful		5	2	2	6		15
Frustrated	2	5	12	7	18	3	47
Optimistic		4	20	8	21	10	63
Relieved			3	2	8	3	16
Satisfied	1		14	8	39	11	73
Sure		2	8	3	11	4	28
Uncertain		5	4	2	2	1	14
Other			1	3	1	2	7

Figure 12

Adjectives by Stages

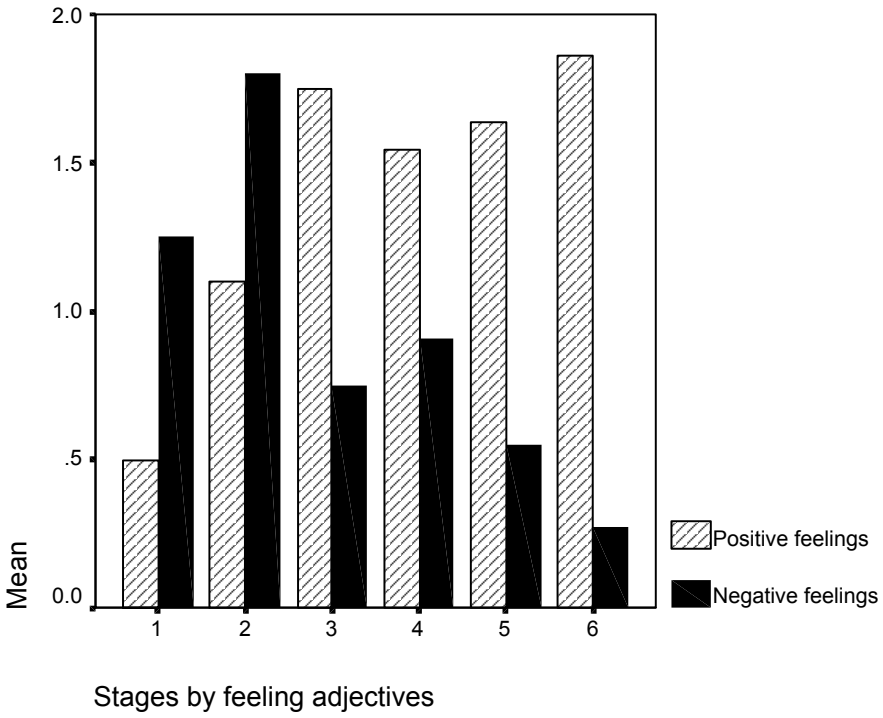
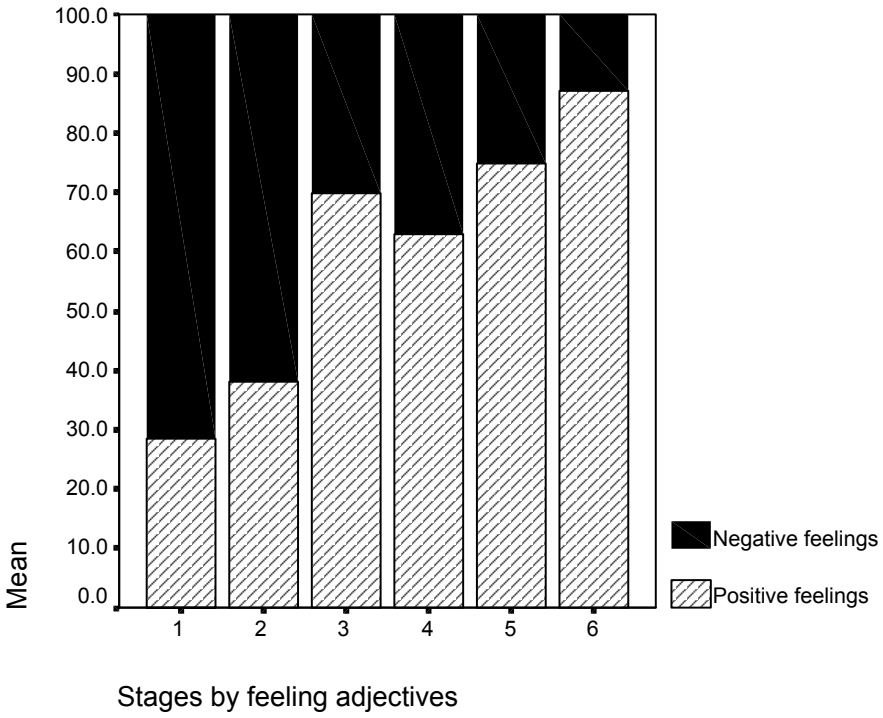


Table 16 shows the number of negative and positive feeling adjectives selected by all respondents in each stage. The table shows that the negative feeling adjectives were more than the positive adjectives in stages 1 and 2. For example, respondents who selected stage 1 in (question 5) had selected five different negative adjectives, as apposed to two different positive adjectives. However, as users progressed into the stages of information seeking (the six stages), their selection of the negative adjectives tended to decrease and the positive adjectives increased (see Figure 12).

Figure 12 was converted to 100 % to see whether there was a pattern. Indeed, there was a pattern, closely related to the Kuhlthau model or construct. It showed that the earlier the stages the respondents were in, the more negative adjectives were selected, and vice versa, except in stages 3 (see Figure 13). When Figure 12 was separated by both sexes it showed some difference between males and females in this area (see Appendix G). The figure that represents female respondents in Appendix G showed a pattern that is very systematic in which as females progress in the information search stages their negative adjectives decreased and positive adjective increased. On the other hand, male respondents in Appendix G showed a pattern that is not very systematic. The difference was stage 3 in which males selected more positive adjectives than stage 4 and stage 5. In general, question 8 showed that users who searched for information or used the Internet during the study behaved in ways that were closely related to the model of Kuhlthau. That is, the closer the users are toward their information or needs the less stressful they would feel. This is because as the users in this study moved into the stages of information search, their selection of negative adjective words decreased.

Figure 13

Adjectives by Stages



There is a small difference between the males and the females in regard to the positive and negative adjectives selected by both sexes. The females had a higher mean value than males in regard to the negative adjective been selected by them. On the hand the males had higher mean value in regard to the positive adjective been selected by them (see Table 17).

Table 17

Adjectives by mean values

Report

Gender		Positive feelings	Negative feelings
Male	Mean	1.6500	.5875
	N	80	80
	Std. Deviation	1.3604	1.0637
Female	Mean	1.5000	.7500
	N	92	92
	Std. Deviation	1.2359	1.0856
Total	Mean	1.5698	.6744
	N	172	172
	Std. Deviation	1.2936	1.0754

Content Analysis of Question 2

This question was related to question 1, part 4, labeled "other uses." Question 2 was posed to elicit what other activities the respondents engaged in during the Web study from November 14 to December 1, 2000. The respondents inputted many different activities. Sixty-four respondents wrote in this section, 31 males and 33 females. The length of the text they wrote varied, with two respondents writing about one page, single-spaced describing a situational activity along with the Internet and school life. Many respondents wrote about one sentence in length about their activities with the Internet, but the majority wrote one, two, or three words.

Although the researcher anticipated that respondents would write short responses, content analysis of respondents' inputs showed the importance of allowing participants to express other issues related to study, because some participants like to express their experiences and feelings in details. Some participants expressed feelings of frustration with the Internet and their search for information. Two respondents wrote lengthy input for question 2 that seem worth mentioning. One female respondent wrote:

> I feel curious to find out more about my topic, which can be frustrating when I am tired of sitting in front of the computer for so long already and want to get away from it! And because the Internet DOES have more information than the library, it often makes the needed information harder to find.

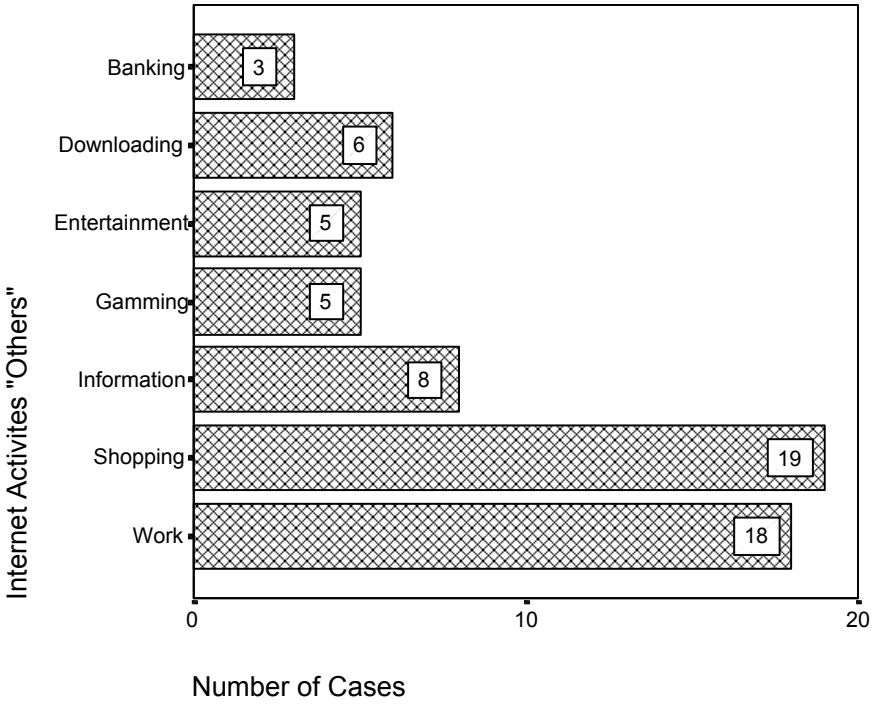
Another female respondent wrote, "The main problem that I experience with Internet searches using Web engines (such as www.google.com) is that many chemistry journals and sites require a subscription to access this information."

The activities or the inputs of the 64 respondents were analyzed and classified into seven different major activities. These activities included shopping, work, information, downloading, entertainment, gaming, and banking. The first activity was related to shopping. The study found that many were shopping on the Internet during the study, either buying presents for Christmas or other needs. Of course, it is the case that the study was administrated during a busy time of the year when people are engaged in shopping.

The second activity concerned work. Many of the respondents wrote about many activities that related to their daily life and work, such as maintaining or developing a Web site, searching for information for work, and others. The third activity was to related to information, which included activities such as searching for information about people, jobs, news, and weather. The fourth activity was related to downloading, which included downloading drivers and computer software. Interestingly, most of the downloading mentioned by respondents was related to music. Five respondents mentioned downloading music, and three mentioned the word Napster as their source. Napster is an Internet company that links the users via the Napster server with the users eventually then to exchange music files. Activities related to banking were mostly about paying bills over the Internet (see Figure 14).

Figure 14

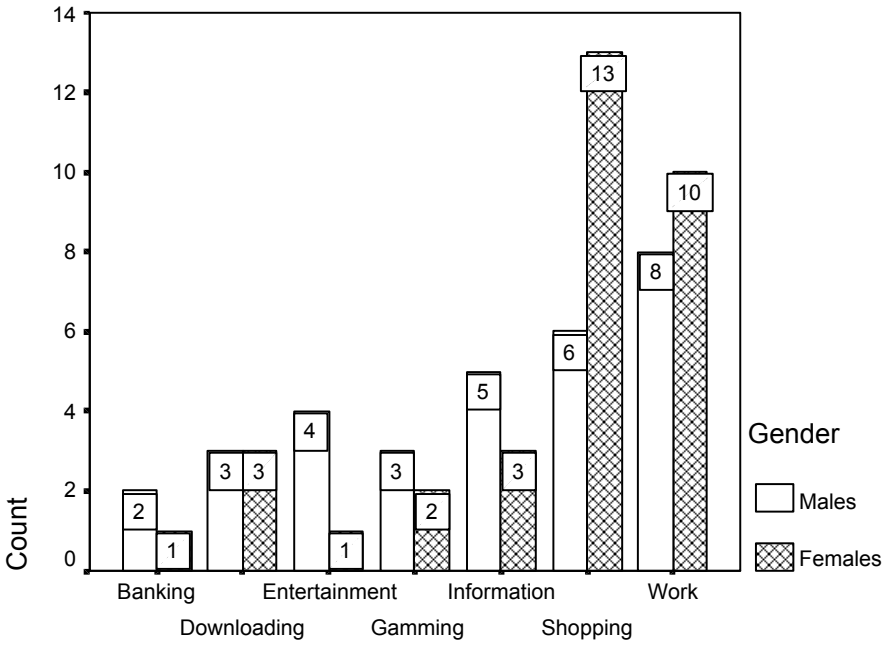
Content Analysis of Question 2



There were variations between males and females concerning their Internet activities. The activities that related to shopping were conducted mostly by females; this activity was reported by 13 females and 6 males. On the other hand, males outnumbered females in regard to activities related to entertainment. However, the genders were equal in regard to activities related to downloading (see Figure 15).

Figure 15

Content Analysis by Gender



Factor Analysis

Table 18

Factor Analysis, Matrix

Rotated Component Matrix[a]

	Component			
	1	2	3	4
(Q10_2) Skills with Internet search	.866			
(Q10_1) Skills with Computers	.830			
(Q9_2) Internet terminology anxiety	-.645	.447		
(Q1_4) Internet activities, Other uses	.543			.367
(Q4_2) Information finding confidence	.468			
(Q9_4) General fear of Internet failure		.769		
(Q9_1) Net search anxiety		.717		
(Q9_3) Internet time delay anxiety		.621		
(Q4_1) Information urgency needs			.793	
(Q1_1) Internet activities, Educational purpose			.769	
(Q5) Stages		-.448	.566	
(Q1_3) Internet activities, Communicating				.783
(Q1_2) Internet activities, Personal use				.742

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Table 19

Factor analysis, Variance

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.307	25.437	25.437	2.556	19.665	19.665
2	2.062	15.864	41.301	2.071	15.930	35.594
3	1.252	9.629	50.930	1.704	13.105	48.700
4	1.163	8.948	59.878	1.453	11.179	59.878
5	.919	7.070	66.948			
6	.781	6.005	72.953			
7	.745	5.731	78.685			
8	.666	5.124	83.808			
9	.589	4.531	88.339			
10	.513	3.945	92.284			
11	.416	3.202	95.486			
12	.381	2.931	98.416			
13	.206	1.584	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis was performed with 13 variables to investigate whether there were significant relationships between certain variables. It was also used to sort the variables that had correlations, according to the factor that most clearly belonged to it. Factor analysis with the Varimax rotation can make the "larger loadings larger and the smaller loadings smaller than their un-rotated values" (SPSS Base 8.0, 1988, p. 331). Statistical Package for the Social Sciences (SPSS) version 10.0.1 was used in the factor analysis. The steps used in the factor analysis through SPSS included the following method: Principal components; Analyze: Correlate matrix; Extract: Eigenvalues over 1; Rotation

method: Varimax; Absolute values less than 0.30 were suppressed.

The variables used in the factors analysis included the following questions from the Web survey questionnaire. All of the variables had a seven-point scale, starting from 0 to 6 except question 5 (see Appendix A). The following are the variables used in the factor analysis, with an explanation of each:

Question 1 asked respondents about their activities during the last 14 days. The activities included searching for information for educational purposes, personal use, communicating, and other uses. The variables were coded as Q1_1, Q1_2, Q1_3, and Q1_4.

Question 4 asked respondents to indicate the urgency or importance of their needs for information. Another sub-question asked the respondents to indicate how confident they were in finding the information needed. The variables were coded as Q4_1 and Q4_2.

Question 5 asked the respondents to select the stage of information searching process they were in. The information search process is made up of six stages, with each having its own distinctive feature. The information search process is based on the Kuhlthau (1990) study. In the present study, the six-stages of information search process model were modified from the original study of Kuhlthau. The variable was coded as Q5 Stages.

Question 9 asked the respondents to tell whether they had experienced anxiety with the Internet within four areas. These areas included anxiety with net search, understanding the terminologies of the Internet, Internet time delay, and general fear of Internet failure that led to not to utilizing the Internet for doing homework assignment or other. Question 9 was adapted and modified from the Presno study. The variables were coded as Q9_1, Q9_2, Q9_3, and Q9_4.

Question 10 asked respondents about how much skill they believed they had with computers and Internet searching and use. The variables were coded as Q10_1 and Q10_2.

The results of factor analysis produced four factors or clusters of variables that had relationships with each another (see Table 18). After investigating the four clusters of variables, labels were derived each factor. These suggested labels were based on the relationships between the variables in each factor.

Factor 1 was labeled Perceived Knowledge With the Internet. The five variables that were loaded in factor 1 are the following: (Q10_2) Skills with Internet search; (Q10_1) Skills with computers; (Q9_2) Internet terminology anxiety; (Q1_4) Internet activities, other uses; and (Q4_2) Information finding confidence. The highest relations or factor loading with Factor 1 were the variable (Q10_2) skills with Internet search and variable (Q10_2) skills with computer. For that reason it was labeled Perceived Knowledge With the Internet. The respondents who felt that they had high skills with computers also felt they had high skills with searching and using the Internet. On the other hand, the variable (Q9_2), which concerned anxiety about understanding the terminologies of the Internet, showed a negative relation with Factor 1. This indicates that users who thought they had high skills with computers and Internet searching and use tended to have low anxiety about understanding the terminologies of the Internet. This relation would work in reverse if the users indicated having low skills for variable Q10_1 and Q10_2. Other variables also correlated with Factor 1, but with small values. One variable was (Q1_4), concerned other than the specified activities on the Internet. The other variable was (Q4_2) concerning how confident the users felt during the study about finding the information they sought.

Factor 2 was labeled Internet and Anxiety. The five variables loaded in Factor 1 are the following: (Q9_2) Internet terminology anxiety; (Q9_4) General fear of Internet failure; (Q9_1) Net search anxiety; (Q9_3) Internet time delay; and (Q5) Stages. Factor 2

showed a unique result in which all of the variables related to anxiety loaded within it except variables Q9_2. The latter variable concerned anxiety about Internet terminology, and was loaded both on Factor 1 and Factor 2. In addition, variable Q9_2, Internet terminology anxiety, had a small partial correlation value with Factor 1. The fifth variable Q5, which concerned the information stages, was loaded in Factor 2 as well as Factor 3, but it was negative in Factor 2. Therefore, there is some indication that the users in this study who responded as having a high level of anxiety were in the earlier stages of the information search process because Q5 was negatively correlated with Factor 2.

Factor 3 was labeled Educational Information Needs. The three variables that were loaded in Factor 3 are the following: (Q4_1) Information urgency needs; (Q1_1) Internet activities, Educational purposes; (Q5) Stages. The variable Q1_1 was loaded only on Factor 2; therefore, it was labeled in relation to education. What Factor 3 showed is that users who responded to searching for information for educational needs in variable Q1_1 would also have an urgent need for information or believed that their needs were important. Variable Q4_1 asked the users about the urgency of their needs for information. Variables Q1_1 and Q4_1 behaved in the same direction, or on parallel. The third variable, Q5, concerning the information stages, also behaved in a similar direction. This indicates that the later the stage, the more the user would believe their information needs were urgent. Thus, they would engage in more activities of searching for educational information needs. The important characteristic of Factor 3 is that

variables Q1_1 and Q4_1 were loaded only in Factor 3 and with considerably high partial correlation. This makes sense because students who usually search for information for educational needs would feel their information needs to be urgent and important.

Factor 4 was labeled Internet and Personal Needs. The three variables that were loaded in Factor 4 are the following: (Q1_4) Internet activities, Other uses; (Q1_3) Internet activities, Communicating; (Q1_2) Internet activities, Personal use. Factor 4 loaded three variables that were considered to be related to activities that were not educational, but rather were for personal needs or information needs. Two variables loaded with considerably high correlation with Factor 4, Q1_3 about communication and Q1_2 about searching for information for personal use. The variable Q1_4, about Internet activities, had a small correlation value and was not clear because it was loaded on Factors 1 and Factor 4. Therefore, it should be disregarded. Factor 4 showed that students doing communication, such as e-mail and chat, had more needs for searching for information for personal use rather than searching for information for educational purposes.

Summary

The study analyzed 178 students' responses made during a two week period. The target sample showed a close relation to the whole campus population, especially gender and educational background. Most of the respondents were younger students, fourth year undergraduate, and from the College of Arts and Sciences. Most indicated using e-mails, search engines, university online catalog, and checking grades or registering online. Students also indicated they least used video and voice communication via the Internet. Most indicated entering a search query directly in the URL designated of the Web browser. Males used FTP more than females. In descending order, students preferred using these searching tools on the Internet and university electronic library: subject, keyword, title, author, and journal name. When students were asked about important sources of everyday-life information needs, the Internet was perceived as the highest, then newspaper, radio, libraries, and TV. Results showed that students who responded spending longer time using the Internet to perceive the Internet as more important than those who spent a shorter time using the Internet. There was a positive correlation between age and perceived skills with computers and Internet searching and use. Most, 78% agreed that they could find information from the Web faster than searching the university library. Only 9% preferred using the regular library card catalog. Most, 90%, strongly agreed that the Internet is useful for education. However, 65% of the respondents preferred taking academic courses by the regular classes than the Internet.

Although most of the students indicated experiencing Internet anxiety with varying degrees in the four areas, Internet time delay anxiety was the highest source of anxiety. Students indicated doing numerous activities on the Internet during the study. In descending order, these activities were communicating, searching for personal information, educational information, and other (mostly shopping). Most of the students responded experiencing stage 5 and next was stage 3. Very few had selected stage 1 and stage 2. A systematic pattern was found between the feeling adjectives and six stages of Kuhlthau model when analyzed with negative and positive categories. The earlier the stages the respondents were in, the more negative adjectives were selected. Males and females behaved similarly in stage 4, 5, and 6. They behaved significantly differently in regard to stage 3 with regard to feelings. Factor analyses loaded four factors and were labeled perceived knowledge with the Internet, Internet and anxiety, educational information needs, and Internet and personal needs. An organizational model is proposed with revisions based on the results of the study (see Appendix L).

CHAPTER 5

Discussion

The Internet is considered an important medium for many university students and they use it almost daily for many activities from searching for information to communicating. Yet, there are areas still in need of further investigations in order to learn about students' information needs and problems. There are few models about information seeking behavior related to the Web environment and little is understood about uses and preferences of university students. This study attempted to employ two models in order to learn about university students and their information seeking behavior. The six stages and the affective components of Kuhlthau mode were used. The study used the six stages and presented them in a hierarchical progression and administrated the study in one snapshot. The results were similar to previous research in which most of the respondents had selected stages 5 followed by stage 3. Byron (1999) found in a study about students in the virtual environment that most of the subjects had selected stage 5 in the initiation and midpoint. Also stage 3 was the next most frequently selected stage in the initiation and midpoint in Byron's study. Another similar study by Bateman (1998) found most of the subjects had selected stage 5, followed by stage 6. Kuhlthau (1990) also found in a study and in the imitation that most experienced stage 5 and next was stage 3 (see Appendix M). Therefore, the presentation of the six stages differently from the original model and in one snapshot survey has at least some reliability because the results were similar to previous studies especially stage 5. Another important outcome involved the affective adjectives that showed a pattern closely related to the basic

construct of Kuhlthau's model. The researcher found the earlier the stages the respondents were in, the more negative adjectives were selected. Also the latter the stages the respondents were in, the more positive adjective were selected. Therefore, analyzing the feelings into positive and negative categories can be useful for understanding the users and their attitudes.

Two significant outcomes of the factor analysis and correlation were found in the study. Results showed a negative relation between Internet terminology anxiety and (skills with internet searching and use) and (skills with computers). This suggests that students who felt having a high skill level with Internet searching and computers use also felt having a low anxiety with Internet terminology anxiety. The other significant outcome concerned the information urgency and Internet activity, educational purposes. This outcome suggests that students who did much of activity with the Internet related to educational purposes also believed their information was urgent. The researcher found that the younger the students are, the less confidant they are regarding their perceived skills with Internet searching and use and skills with computer. Most of the students responded that the Internet is the most important source of information for their everyday life information needs source, and 90% think it is useful for their education. The researcher found students felt having anxiety about Internet time delay more than other anxieties Females felt having Internet anxiety in the four areas more than males, especially Internet terminology anxiety. Also females in the current study tended to mark higher values on the scale more than males. This was confirmed by Burdick (1995) who

found females have anxiety double that of males in a study related to information search process.

General Hypothesis 1

Students who search for information on the Internet will experience the six stages of the information search process and experience feelings similar to those on the Kuhlthau model.

The study used Kuhlthau's model in constructing a scale representing the six stages. The students were asked to select just one stage that represented them during the time of the study. According to Kuhlthau (1993), users usually experience six stages when they search for information; her study originally targeted users in the library. This study applied the model to the Web environment. The stages are task initiation, topic selection, early exploration, focused formulation, information gathering, and search closure. For the feeling component, the students were asked to select feeling adjectives similar to the adjectives used by Kuhlthau's survey. The study then compared the feeling adjectives with each stage selected by the respondents. The feeling adjectives were sorted into negative and positive categories by taking the total sum. Then, the sum of both negative and positive adjectives was compared with the six stages of the information search process.

In general, this hypothesis was confirmed. The students did experience feelings very similar to those on the Kuhlthau's model. The study revealed that students who selected negative feelings adjectives were mostly in the early stages and those who selected the positive adjectives were in the later stages. The study found a systematic pattern in which the earlier the stages the respondents were in, the more negative adjectives were selected. Also the latter the stages the respondents were in, the more positive adjective were selected.

On the other hand, the study found that very few students had selected either stage 1 or stage 2. The majority of respondents selected stages 3, 4, 5, and 6. Therefore, based on the results of the study and based on the original model of Kuhlthau, a revised model might work better if it consisted of only stages 3, 4, 5, and 6. That would represent a closer reality concerning the information seeking of students using the Internet. Still further research is needed to learn and conform more about this.

General hypothesis 2

Some demographic differences, such as gender, will impact the feelings within the information search process, specifically the stages.

This hypothesis was confirmed. The study revealed a difference between males and females in relation to the positive and negative adjectives selected for each stage.

Appendix G shows two figures representing the pattern between negative and positive adjectives for each stage of the ISP for both sexes. Although the two seem similar, the difference is that the figure representing males shows males to be more positive in stage 3 than stages 4 and 5 and almost equal with stage 6. The figure representing the females showed a systematic pattern that is very close the concept of the Kuhlthau model in which the earlier the user is in the information stages the more negative he or she would be.

Research Questions

Response Rate:

Question: Who are the respondents of the study, and what are their demographics and backgrounds?

The students who responded to the study included 92 females and 80 males. Their percentages were 53% females and 46% males. This was very close to the ratio of the population of University of North Texas, which included 54.7% females and 45.3% at the time of the study. Their backgrounds showed that most were younger students, especially in the age range between 17-25, who accounted 61% of all respondents. Most were full-time students, representing 80% of all respondents. Most of the respondents were senior students, or a percentage of 33.7%. Students from the College of Art and Sciences responded most frequently, with a percentage of 47.9 of all respondents in the

study. The College of Art and Sciences at the University of North Texas has the largest student population. Therefore, based on results of this study, it can be concluded that the sample represented a very close ratio to the population of the study.

Usability:

Question: What activities such as e-mail, checking grades online, IRC chat, and others are related to the Internet, and which do the students engage in?

In order, the following were most often selected by the respondents: use e-mail, use search engines, check grades or register online, search the university online catalog, use commercial sites, use IRC or chat, use FTP, and search other school libraries. Small differences existed, especially with the FTP, in that males used it more than females.

Question: Which search tools such as searching under author name, title, journal name, and others are preferred by students?

Results showed that students preferred and used the following search tools organized in a subsequent order: subject, keyword, title, author, journal name, "AND," and "OR." Call number and date were less preferred tools for searching. Some differences existed between the age ranges of the respondents. Older students tended to use or search under journal name more than did younger students.

Question: Which primary sources of everyday-life information needs are preferred by the students, such as the Internet, radio, TV, newspapers, and libraries?

Result showed that most of the respondents and both sexes, especially the younger students, perceived the Internet as a more important source of everyday life information than the TV, radio, newspapers, and libraries. Also, the results showed a relation between students who responded that they spent many hours using the Internet per week and their higher perceived importance of the Internet. Results showed that most of the students, 74%, responded that they preferred printing long Web texts and reading them later to reading them on the monitor.

Search Engines:

Question: How much do the students use Internet search engines, and what are their preferences?

Respondents were asked in the Web survey about the uses of Internet search engines. The results showed that 97% of the students replied using the "search engines" and 62% replied using "meta/multi search engine." Meta or multi search engines are search engines that use more than one search engines at the same time in order to search for relevant information. Another type of search engine uses multi search engines but with a software program. Results showed that most of the respondents were either not

familiar with multi search engines that use software program or did not use them. Only 13.4% replied that they use them.

Question: Do they enter a search query directly into the URL address of the Web browser, and how did they learn this technique for the first time?

Results showed that most of the students, 77%, entered a search query in the URL designated address of the Web browser. They replied that they used this method by self-learning, 56% of all the respondents. Another 17% replied that they learned this method from someone else. Surprisingly, no one indicated that they learned this technique from advertisements. The study speculated that advertisements might contribute to users using the URL address of the browser to search and surf the Internet because it is noticeable at the present time that many advertisers use the URL address of their Internet sites to advertise.

Perceptions:

Question: How much skill do the students feel they have in using the computer and in Internet searching and use?

Results showed that most students felt they have skills with computers and Internet searching and use, almost equally for both items. The mean values were 4.53 for skills with computer using and 4.6 in regard to Internet searching and use. These results

indicate that the majority believes they have adequate skills for both items. No differences were found between males and females. However, the age factor showed differences between the respondents. Younger students, especially age 17-25, responded that they have lower skills, both skills with computers and skills with Internet searching and use, than do older students. This issue is important, and educators and Web designers should consider this fact and develop strategies for enhancing the skills of younger students.

Question: What do the students think and prefer concerning information on the Internet, the library, electronic library catalog, and the regular card catalog?

Most of the respondents, 90%, preferred using the electronic library catalog on the Web. Only 9% preferred using the regular library card catalog. This information shows that the library card catalog is becoming less preferred by the users as compared with electronic library catalog. Therefore, the electronic library catalog should be the focus of more development. Results showed that 90% believed the Internet is useful for their educational learning. Seventy percent preferred searching the Internet first and then the library when they need information. Eighty percent of the respondents would prefer doing an electronic online survey to completing a survey with paper and pencil. Therefore, the online survey should be considered and have priority when conducting a research related to the Internet.

Internet Anxiety:

Question: Do students have anxieties with the Internet and to what degree can anxiety be related to use, perceptions, and activities?

Based on a qualitative study by Presno (1998), there are four areas of Internet anxiety, including, net search anxiety, Internet terminology anxiety, Internet time delay, and general fear of Internet failure. The study found that most had anxiety with the Internet to varying degrees. The important outcome of this section is that Internet time delay was the area of most anxiety for the respondents, with a mean value of 3 on the seven-point scale, with 0 representing no anxiety. It can be concluded that students worry more about Internet time delay than the other three anxieties, such as taking a longer time for downloading or accessing the Web. Therefore, the efforts should concentrate on developing better Internet, faster connections.

Internet Activities:

Question: What types of activities did the students engage in during the study that were related to searching for information for educational or personal and communication?

The result showed that most students responded that they had engaged in various activities with the Internet during the study. The activity related to communication was the highest, such as writing e-mails. Activities related to personal uses reported next highest, followed by activities for educational purposes. These results indicate that

students use the Internet primarily for personal needs. Males and females responded to this question equally, which indicates that there is no difference between them in regard to the activities; nor was there a difference in the age factor. However, analysis showed a significant relationship between Internet activities and the amount of time spent weekly using the Internet. The more hours students used the Internet, the higher the values students gave to Internet activities, especially the item related "other."

Internet Activities and the information search Process:

Question: Which stage of the information search process did most of the students experience during the study?

The study was an attempt to learn about the information search process and specifically the six stages. According to Kuhlthau's model when users search for information for a reason, they would experience six different stages. These stages are task initiation, topic selection, early exploration, focused formulation, information gathering, and search closure. The stages were numbered in sequential numerical order in order to describe the changing state of the user during his or her search for information. Feelings, thoughts, and actions were the criteria that used in describing users in each stage. Stage 1 describes the user when he or she recognizes a need for information or when he or she receives an assignment. Stage 2 describes the user when he or she tries to select a general topic for research. Stage 3 evolves the early exploration of information. Stage 4 is when the user formulates a focus from the information he or

she got. Stage 5 is when the user searches for and gathers information with a good understanding of what he or she needs and where to look. Stage 6 is when the user has enough information and prepares to present or use the information obtained (Kuhlthau, 1989, 1991, 1993).

The study found 41% of students responded as being in stage 5, the stage at which the user collects information and know where to search and how best to search. Stage 3 was reported the next most frequently, with 21% of the respondents reporting at that stage. Stages 4 and 6 were equal; that is, 13% of the respondents selected each. Results showed that very few students selected stages 1 and 2. Only 2% of respondents selected stage 1, and 6% selected stage 2. The study also found that 72% of the students answered "yes" to experiencing more than one stage ate the same time. Question 7 sought to investigate which stages the students felt they were experiencing at the same time. The correlation between stages 1 and 2 was the highest. This indicates that the respondents selected them together most often. Males and females seemed to behave similarly, and no significant differences were found.

Future Research and Implications

The researcher surveyed university students in one snapshot during a busy time period of the academic year, one in which most the students were involved with their schoolwork. Students usually engage and seek information from the Internet in different times depending on their needs. Perhaps there are times of the academic year that students engage less or more. Therefore, future research is needed to expand understanding about students' engagements with the Internet at different times during the academic year. Perhaps the survey ought to be administrated more than one time and not necessarily with same subjects in order to determine whether there is a significant difference in the number of respondents reporting stage 1 and 2. If there is no a significant difference, perhaps these two stages could be removed for the university Web environment search model.

Understanding the time of the year or day that students engage most with the Internet might help Web designers and information specialists prepare and design better Internet interface and system maintenance. An example of improved Internet interface might consider the layout and amount of the text. Results of the study showed that 73% of the respondents in this study preferred printing long Web text documents and reading them later and only 24% preferred reading form the monitor. It seems that reading from the monitors might not be a comfortable for many students or perhaps other reasons; therefore, further research is needed to learn about the causes in order to present information in most efficient and comfortable ways. Another important issue was that

65%of the respondents in this study did not prefer taking academic course via the Internet. It is noticeable in the current time that many educational institutions to either providing distance education or considering through the Internet. Understanding the causes for students' rejection of taking academic courses via the Internet should be investigated in order to develop and improve distance education via the Internet, which will definitely be the future of the new education.

The feeling part of the survey and the separation of the adjectives into positive and negative categories were found to be useful and demonstrated results closely related to the construct of Kuhlthau model. Therefore, investigation with different factors and different environments might be helpful for developing better techniques for analyzing users' information need and problems. Asking users about their information needs can be difficult for them, but asking them about how they felt can be easer. This study found males and females to behave similarly in regard to the feeling part and the six stages except stage 3, which was the only obvious difference between the two sexes. Stage 3 is the stage in which the users search for information in order to extend understanding or find a focus from the information. Stage 3 is considered an early stage in the information search. The question here is why most of the males in this study had selected stage 3 more than females although the number of females was bigger. In addition, very few had selected stage 1 and stage 2. The six stages and the model of information search process of Kuhlthau were originally developed in the library environment. It was also a task oriented in which student were given assignments and asked to search for information

from the library in order to do their assignments. The researcher tried to employ parts of Kuhlthau model with other measures to learn about students and their use of the Internet. Therefore, further research might try investigating and confirming with studies in different environments and to investigate whether students would select stage 1 and stage 2 or not, and whether males and females differ in their information seeking behavior and Internet anxiety. This difference between males and females at stage 3 also implies possible areas for investigation in instruction on using the Web for schoolwork.

Students search for information from the Web for many reasons, which can be educational and personal. Some suggestions for future research might try investigating other factors that were not researched in this study such as relevance. Students select information over another because of it relevance to their needs. Schamber and Bateman (1996) found and investigated many criteria that influenced selecting one type of information over another, such as, but not limited to currency, availability, celerity, and credibility. Therefore, it might be useful to extend and employ information relevance with studies related to the Internet in order to learn why they selected information in the first place and if they found what they have been looking for.

Most of the students in this study indicated experiencing anxiety with the Internet that included net search anxiety, Internet terminology anxiety, general fear of the Internet, and Internet time delay anxiety. Interestingly, Internet time delay was the greatest source for anxiety for many in this study. Also, there was a difference on the

level of Internet anxiety between males and females. Therefore, learning about the sources of Internet anxiety and relating them to the six stage might be helpful for educator and Web designers to test the effectiveness of their services, and progress and productivity of the users.

Users in different cultures might behave differently when searching for information from the Internet and might experience different feelings. The researcher investigated university students and their use and search for information from the Web in the United States. Other cultures of different countries might need further research in this area because it is little understood in regard to information seeking behavior from the Internet. For example, in the Arab world, the values and beliefs are different. Access for information and the use of the Internet are perceived differently than the countries in the Western world. Therefore, it will be interesting to extend and employ similar research in different cultures in different countries to determine if the Kuhlthau search stages hold; if feelings hold in a similar patterns; and if gender differences remain or show significant differences.

APPENDIX A

The WEB SURVEY

Electronic Survey about University Students and the Internet

1. During the last 14 days, what have you been doing on the Internet?

Please assign a rating on a scale from 0 to 6, where 0 represents "No Activity" and 6 represents "Maximum Activity".

	0	1	2	3	4	5	6
Searching for information for educational purpose	O	O	O	O	O	O	O
Searching for information for personal use	O	O	O	O	O	O	O
Communicating, such as e-mail or chat	O	O	O	O	O	O	O
Other uses	O	O	O	O	O	O	O

2. If "Other uses" is marked in the table above, please specify:

3. Please select the following only if both of the first two items in the table above were selected as "No Activity" (0)

O **I selected no search activity for educational or personal use** [Go to question 9]

4. If you have been searching for information on the Internet:

Please assign a rating on a scale from 0 to 6, where 0 represents "Low" and 6 represents "High".

	0	1	2	3	4	5	6
Indicate how urgent or important your need for information is	O	O	O	O	O	O	O
Indicate how confident you are in finding the information you need	O	O	O	O	O	O	O

5. People searching for information often go through different stages. Please indicate the one stage that best describes you at this point.

O **Stage one: Task initiation** (just recognized a need for information and thinking how to start and where to look)

O **Stage two: Topic selection** (having different topics and trying to select or decide on which topic or selection to search for information)

O **Stage three: Early Exploration** (searching **for** information in order to find a focus and understanding about a general topic that later will help gather more relevant information)

O **Stage four: Focused Formulation** (trying to find a focus or understanding about your topic **from** information you got)

○ **Stage five: Information Gathering** (searching and collecting information extensively)

○ **Stage six: Search Closure** (having enough information and thinking about stopping the search for information and using the findings)

6. Do you feel you are experiencing more than one stage at the same time?

○ **Yes**
○ **No**

7. If yes, mark the stages that apply to you. You can select more than one item.

☐ **Stage one : Task initiation**
☐ **Stage two :Topic selection**
☐ **Stage three :Early Exploration**
☐ **Stage four: Focused Formulation**
☐ **Stage five: Information Gathering**
☐ **Stage six: Search Closure**

8. In general, how do you feel at this point about your search for information from the web? Please select all that apply.

☐ **Confident**
☐ **Confused**
☐ **Disappointed**
☐ **Doubtful**
☐ **Frustrated**
☐ **Optimistic**
☐ **Relieved**
☐ **Satisfied**
☐ **Sure**
☐ **Uncertain**
☐ **Other**

9. Please tell whether you experience Internet anxiety in these areas:

Please assign a rating on a scale from 0 to 6, where 0 represents "None" and 6 represents "A lot".

	0	1	2	3	4	5	6
Net Search Anxiety (worrying about web problems such as dead links or web pages not found	O	O	O	O	O	O	O
Internet Terminology Anxiety (don't understand HTML, URLs, FTP and other internet terms)	O	O	O	O	O	O	O
Internet Time Delay (taking a longer time to download or access web pages)	O	O	O	O	O	O	O
General fear of Internet failure (worrying about not utilizing Internet to complete homework assignment or other personal needs)	O	O	O	O	O	O	O

10. How much skill do you fell you have with:

Please assign a rating on a scale from 0 to 6, where 0 represents "None" and 6 represents "A lot".

	0	1	2	3	4	5	6
Computers	O	O	O	O	O	O	O
Internet searching and use	O	O	O	O	O	O	O

11. Tell what you think about the following statements:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I can find information from the Web faster than searching the library	O	O	O	O	O
The Internet has more information than the library does	O	O	O	O	O
The Internet is useful for my education	O	O	O	O	O
Finding information in the library is faster than searching the Web	O	O	O	O	O
The library has more information than the Internet does	O	O	O	O	O
I would rather use the university online or electronic catalog than the regular library card catalog	O	O	O	O	O
I prefer searching the Internet first, then the library for information	O	O	O	O	O
I prefer using library card catalog than university online catalog	O	O	O	O	O
In the future, I would rather					

In the future, I would rather do an electronic online survey than a paper and pencil survey	O	O	O	O	O

12. How often do you use the following?

	Often	Sometimes	Rarely	Never
Search in university online catalog via Internet	O	O	O	O
Search the catalogs of other schools via the Internet	O	O	O	O
Use search engines to search for information on the Internet	O	O	O	O
Use E-mail	O	O	O	O
Use IRC Chat or text communication	O	O	O	O
Use voice communication over the Internet	O	O	O	O
Use voice and video communication	O	O	O	O
Check grades or register online (Internet as gateway)	O	O	O	O
Interlibrary loan or other library activities (Internet as gateway)	O	O	O	O
Use FTP (File Transfer protocol)	O	O	O	O
Use Usenet/Newsgroups	O	O	O	O
Use Telnet (Remote login)	O	O	O	O
Use commercial sites such as Amazon or Barnes & Noble	O	O	O	O

13. When using a Web search engine or the university electronic library, how often do you use the following search tools?

	Often	Sometime	Rarely	Never
Subject	O	O	O	O
Author	O	O	O	O
Title	O	O	O	O
Date	O	O	O	O
Keyword	O	O	O	O
Call number	O	O	O	O
Journal name	O	O	O	O
Course reserves	O	O	O	O
AND	O	O	O	O
OR	O	O	O	O
NOT	O	O	O	O

14. For your everyday life information needs, which do you think is most important?

Please assign a rating on a scale from 0 to 6, where 0 represents "Unimportant" and 6 represents "Very important".

	0	1	2	3	4	5	6
TV	O	O	O	O	O	O	O
Radio	O	O	O	O	O	O	O
Internet	O	O	O	O	O	O	O
Newspapers	O	O	O	O	O	O	O
Libraries	O	O	O	O	O	O	O

15. Please answer the following:

	Yes	No	Not familiar
Do you use search engines?	O	O	O
Do you use meta/multi search engines?	O	O	O
Do you use meta/multi search engines with a software program?	O	O	O
Do you sometimes enter a search query directly in the address place of the web browser, such as for example: http://www.music.com	O	O	O

16. If you answered "yes" to the previous question (Do you sometimes enter a search query directly....), how did you learn about this technique for the first time?

- O **Someone told me**
- O **Self learning**
- O **Coincidence**
- O **Advertisement**
- O **Others**

17. Have you taken any courses about the internet?

- O **Yes**
- O **No**

18. I prefer taking courses via:

- O **The Internet**
- O **Regular classes**
- O **Either**

19. How did you learn the skill of using the Internet?

- O **School**

- ○ Friend or other people
- ○ Self taught
- ○ Other

20. I prefer reading long pages of text web pages from:

- ○ Monitor
- ○ Print and read later

21. Do you have a personal home page?

- ○ Yes
- ○ No
- ○ Considering

22. How many hours per week do you use the Internet?

- ○ 1-5
- ○ 6-10
- ○ 10-15
- ○ 15-20
- ○ 21 and up

23. My college major is:

Major

24. I go to college:

- ○ Full time
- ○ Part time
- ○ Part time evening classes only

25. My college status is:

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior
- ○ Master
- ○ PhD or higher
- ○ Other

26. My gender is:

- ○ Male
- ○ Female

27. My age is:

- ○ **17-25**
- ○ **26-30**
- ○ **31-35**
- ○ **36-40**
- ○ **41 and up**

28. My citizenship is:

- ○ **American**
- ○ **International**

29. I am a University of North Texas student

- ○ **Yes**
- ○ **No**

Thank you for taking the time to complete this survey. Select Submit Survey now to send your responses to us.

Submit Survey | Clear All Answers

Note.

Questions 5 and 7 were adapted and modified from Kuhlthau (1990, 1991, 1993)

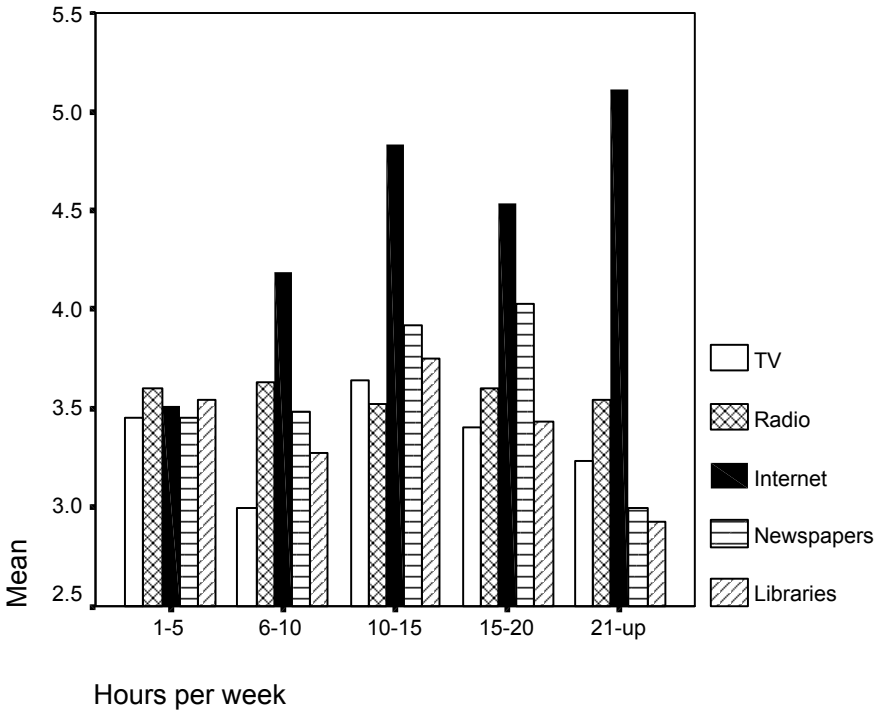
Question 8 was adapted from Kuhlthau (1990)

Question 9 was adapted and modified from Presno (1998)

The fonts of some parts of questions 5 and 7 were colored red on the Web survey.

APPENDIX B
QUESTION 14 BY THE HOURS

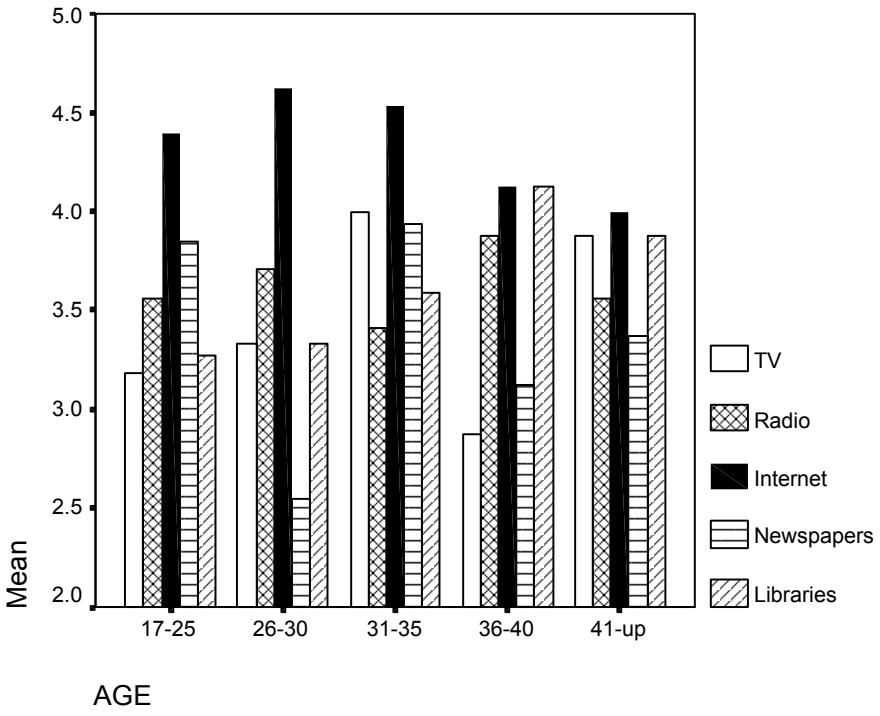
Appendix B (question 14 by hours)



APPENDIX C

QUESTION 14 BY THE AGE

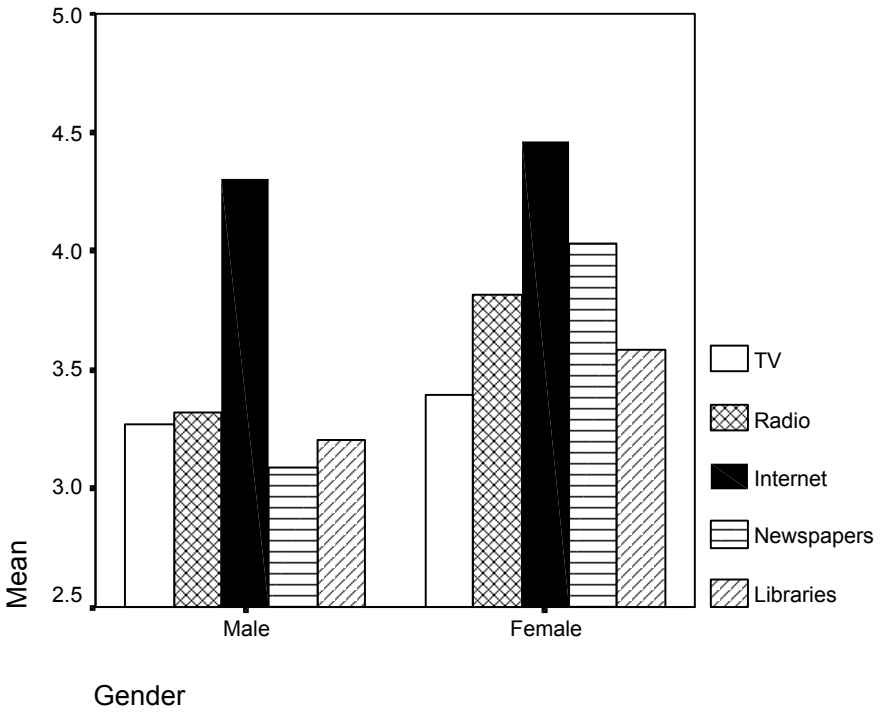
Appendix C (question 14 by the age)



APPENDIX D

QUESTION 14 BY THE GENDER

Appendix D (question 14 by gender)



APPENDIX E

UNT LETTER

UNIVERSITY of NORTH TEXAS

Office of Research Services

October 31, 2000

Esmaeel Shamo
1314 Windstream
Denton, TX 76209

RE: Human Subjects Application No. 00-216

Dear Mr. Shamo,

Your proposal titled "University Students and the Internet: Information Seeking Study" has been approved by the Institutional Review Board and is exempt from further review under 45 CFR 46.101.

The UNT IRB must review any modification you make in the approved project. **Federal policy 21 CFR 56.109(e) stipulates that IRB approval is for one year only.**

Please contact me if you wish to make changes or need additional information.

Sincerely,

Rollie Schafer, PhD
Vice Provost for Research

RS:sb

P.O. Box 305250 ◆ Denton, Texas 76203-5250 ◆ (940) 565-3940
Fax (940) 565-4277 ◆ TDD (800) 735-2989 ◆ www.unt.edu

APPENDIX F

COVER LETTER

Cover letter

Dear participants:

Thank you for participating in this study. My name is Esmaeel Shamo.

I am a doctoral student in the School of Library and Information Science at the University of North Texas. I am conducting a study about Internet usability and information seeking. Your participation is important and beneficiary in the field that I hope will provide a better understanding of student's information-seeking problems and needs with the Internet. This survey should take approximately 15 minutes or less. Your participation is voluntary and you can withdraw at any time without prejudice or penalty. There are no known risks involved in this research study. All information will be kept confidential and does not put your name on the survey. If you have any questions please contact me at (940) 320-1264 or call my faculty sponsor, Dr. Brian O'Connor, (940) 565-2347. This research has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

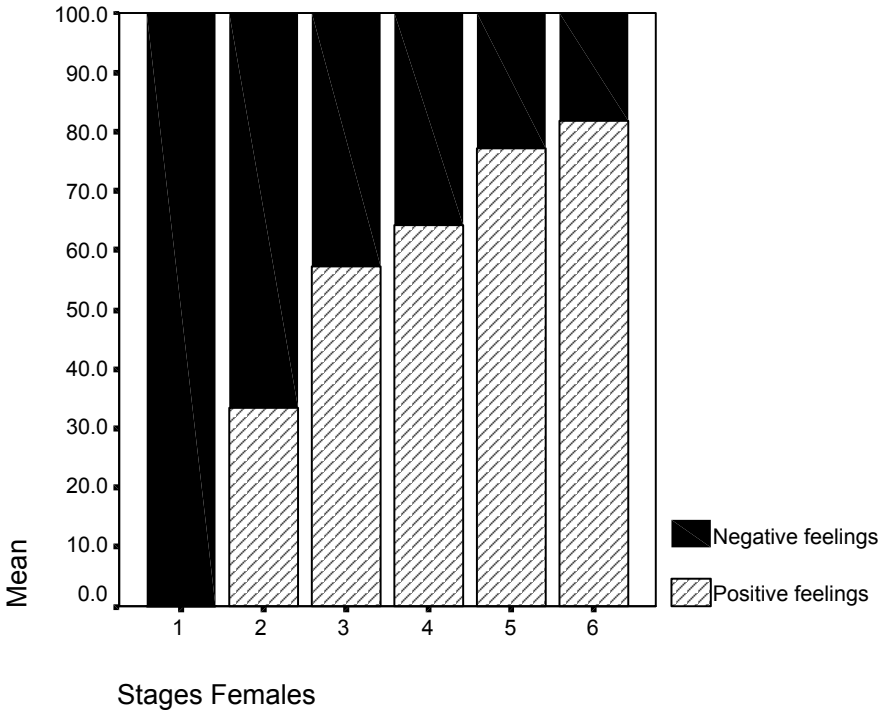
Thank you for your help.

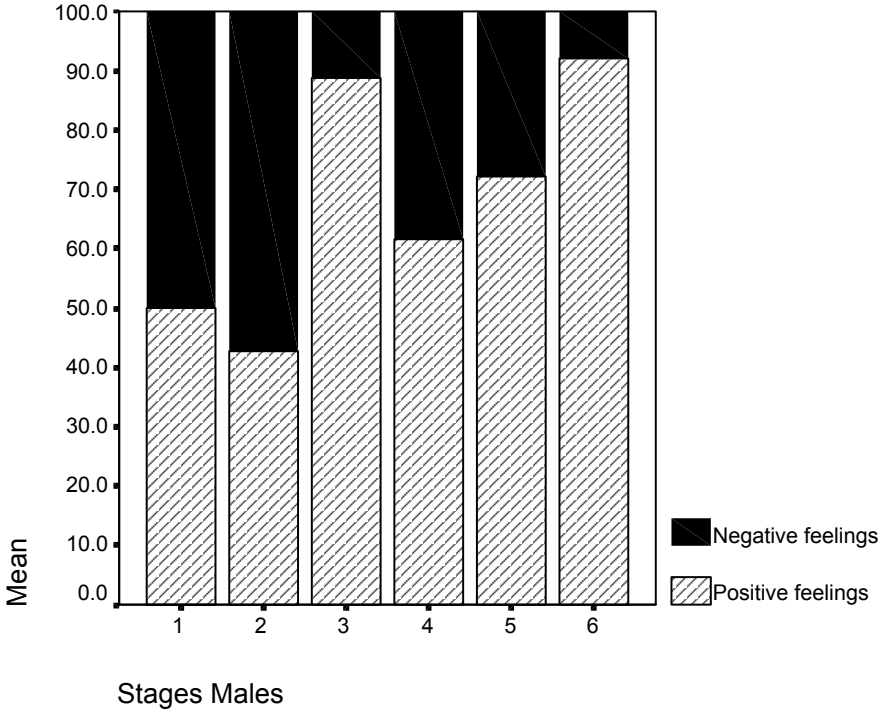
If you agree to the preceding terms you may begin the study.

APPENDIX G

QUESTION 8 BY GENDER

Appendix G (question 8 by gender)

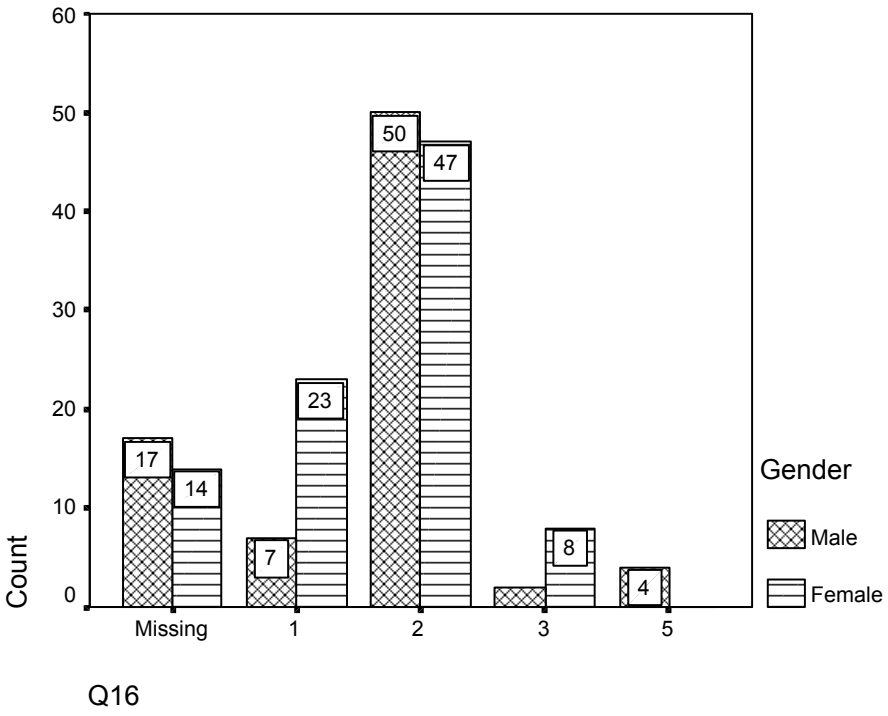



100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Mean
1
2
3
4
5
6
Stages Males
Negative feelings
Positive feelings

APPENDIX H

QUESTION 16 BY GENDER

Appendix H (Question 16 by Gender)



Note.

1. Someone told me
2. Self learning
3. Coincidence
4. Advertisement (No one selected this item)
5. Others

APPENDIX I
SCHOOLS AND COLLEGES AT UNT

Schools and Colleges at UNT

College of Arts & Sciences
- General Studies
- Social Science
- *Biology:*
  - Biochemistry
  - Biology
- Cytotechnology
- Environmental Sciences
- Medical Technology
- Molecular Biology
- Chemistry
- Communication Studies
- Computer Sciences
- ***Dance & Theatre Arts:***
  - Dance
  - Theatre Arts
- ***Economics:***
  - Economics
- Economics Research
- Labor & Industrial Relations
- Engineering Technology
- English
- ***Foreign Languages:***
  - French
  - German
  - Spanish
  - Latin
- Geography
- History
- Journalism
- Mathematics
- Philosophy
- Physics
- Materials Science
- Political Science
- ***Psychology:***
  - Psychology
  - Clinical Psychology
  - Counseling Psychology
  - Experimental Psychology
  - Health Psychology & Behavior Medicine
  - Industrial Psychology
  - School Psychology
- Radio/TV/Film
- ***Speech & Hearing Services:***
  - Audiology
  - Speech-Language Pathology
  - Speech-Language Pathology/Audiology

School of Merchandising & Hospitality Management
- Hotel & Restaurant Management
- Home Furnishings Merchandising
- Industrial – Tech. Merchandising & Fabric Design
- Merchandising

College of Business Administration
- General Business
- Accounting
- Accounting Control Systems
- Busi. Computer Info. Systems
- Management Science
- Economics
- Finance
- Insurance
- Real Estate
- Real Estate Analysis
- Management
- Administrative Management
- Entrepreneurship & Strategic Management
- Human Resource Management
- Organizational Behavior & Human Resource Management
- Organization Theory & Policy
- Production & Operations Management
- Secretarial Administration
- Marketing

School of Community Service
- Applied Arts & Sciences
- Administration of Aging Organizations
- Admin. of Long-Term Care & Retirement Facilities
- Studies in Aging
- Behavioral Analysis
- Criminal Justice
- Emergency Admin. & Planning
- Public Administration
- Rehabilitation Services
- Rehabilitation Studies
- Social Work
- Sociology
- Anthropology
- Applied Economics

College of Music
- Composition
- General, Choral & Instrumental Music
- Jazz Studies
- Music
- Music Education
- Music History & Literature
- Musicology
- Music Theory
- Performance

Toulouse School of Graduate Studies
- Interdisciplinary Studies

School of Library & Info. Sciences
- Information Science
- Library Science

College of Education
- ***Counseling, Development & Higher Education:***
  - Child Development
  - Counseling & Student Services
  - Higher Education
  - Human Development & Family Studies
  - Counseling Associate Studies
- ***Kinesiology, Health Promotion, Recreation:***
  - Health Promotion
  - Kinesiology
  - Recreation & Leisure Studies
- ***Teacher Education & Administration:***
  - Business Education
  - Curriculum & Instruction
  - Early Childhood
  - Early Childhood Education
  - Elementary Education
  - Elementary School Supervision
  - Education Administration
  - Interdisciplinary Studies
  - Reading Education
  - Secondary Education
  - Secondary School Supervision
  - Special Subject Supervision
- ***Technology & Cognition:***
  - Applied Technology, Training & Development
  - Computer Education & Cognitive Systems
  - Educational Research
  - Occupational Training & Development
  - Special Education

School of Visual Arts
- Art
- Art Education
- Art History
- Ceramics
- Communication Design
- Drawing & Painting
- Fashion Design
- Fibers
- Interior Design
- Metalsmithing & Jewelry
- Photography
- Printmaking
- Sculpture
- Visual Arts Studies

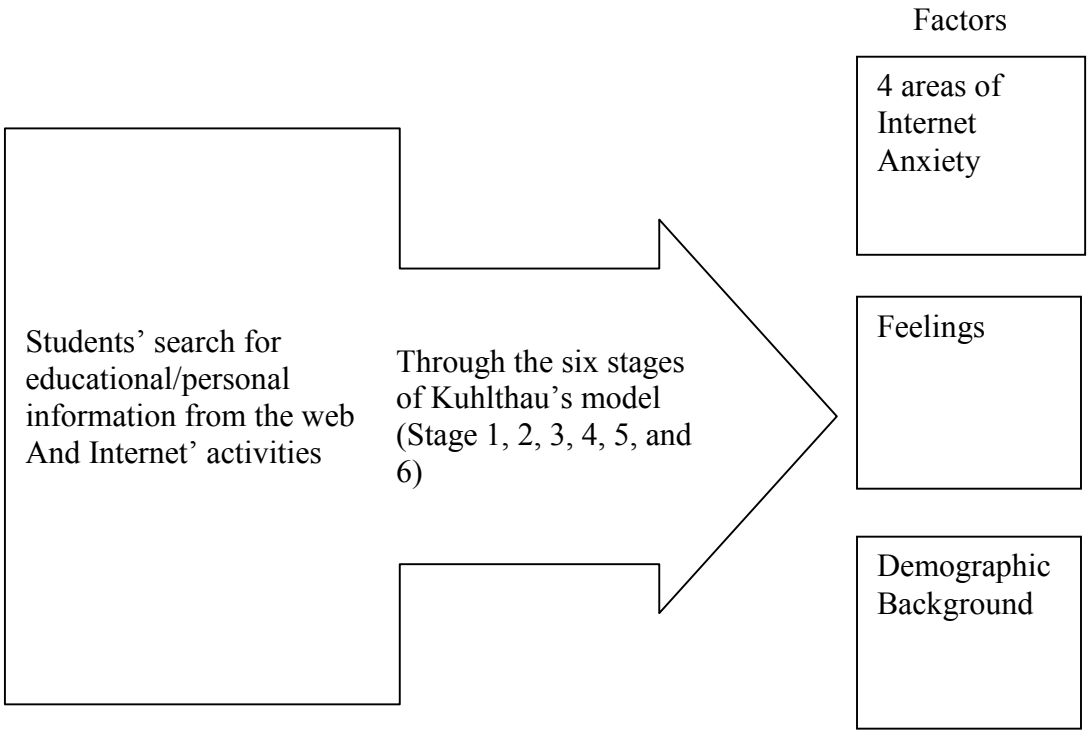
APPENDIX J
CORRELATIONS OF QUESTION 7

Appendix J (Correlation between items of question 7)

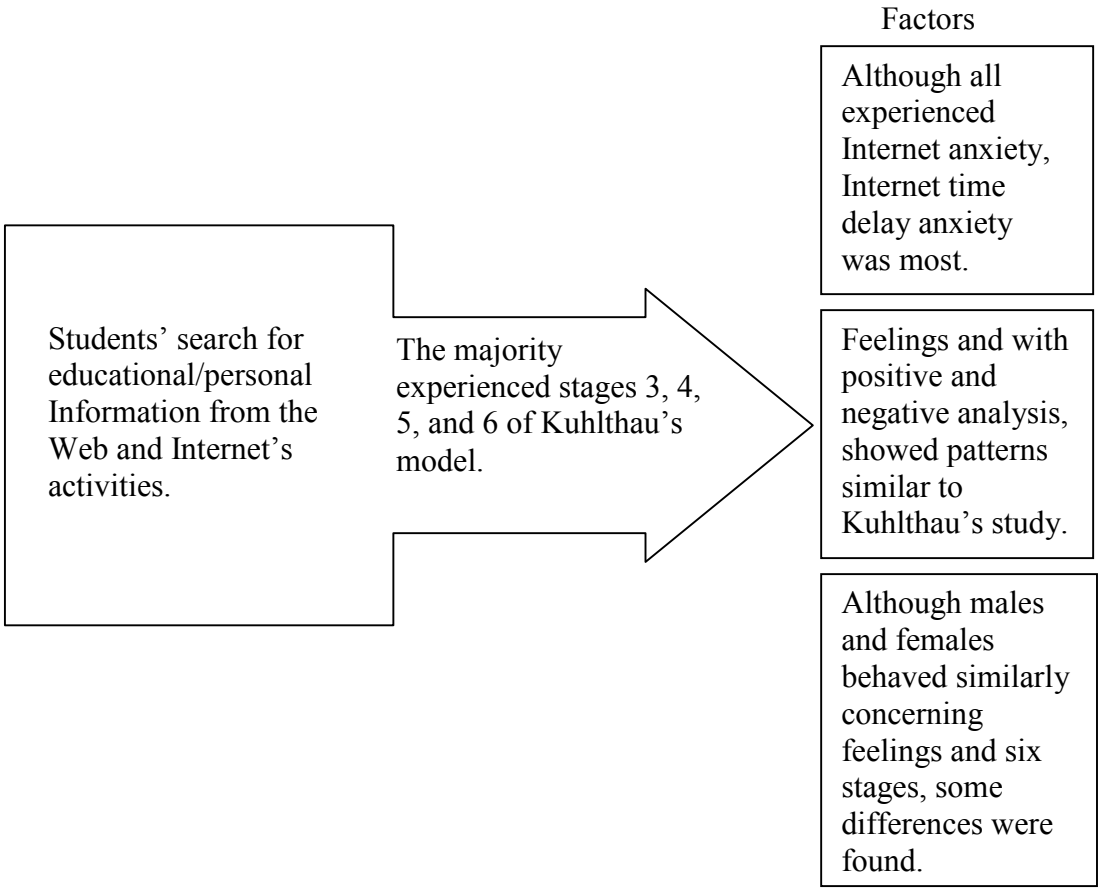
Correlations							
		Stage one	Stage two	Stage three	Stage four	Stage five	Stage six
Stage one	Pearson Correlation	1.000	.572(**)	.153(*)	-.059	.080	.167(*)
	Sig. (2-tailed)	.	.000	.045	.444	.295	.028
	N	172	172	172	172	172	172
Stage two	Pearson Correlation	.572(**)	1.000	.309(**)	.099	.006	.072
	Sig. (2-tailed)	.000	.	.000	.196	.933	.346
	N	172	172	172	172	172	172
Stage three	Pearson Correlation	.153(*)	.309(**)	1.000	.364(**)	.331(**)	.027
	Sig. (2-tailed)	.045	.000	.	.000	.000	.727
	N	172	172	172	172	172	172
Stage four	Pearson Correlation	-.059	.099	.364(**)	1.000	.431(**)	.183(*)
	Sig. (2-tailed)	.444	.196	.000	.	.000	.016

	N	172	172	172	172	172	172
Stage five	Pearson Correlation	.080	.006	.331(**)	.431(**)	1.000	.440(**)
	Sig. (2-tailed)	.295	.933	.000	.000	.	.000
	N	172	172	172	172	172	172
Stage six	Pearson Correlation	.167(*)	.072	.027	.183(*)	.440(**)	1.000
	Sig. (2-tailed)	.028	.346	.727	.016	.000	.
	N	172	172	172	172	172	172
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

APPENDIX K
ORGANIZATIONAL MODEL


Factors
4 areas of Internet Anxiety
Feelings
Demographic Background
Students' search for educational/personal information from the web And Internet' activities
Through the six stages of Kuhlthau's model (Stage 1, 2, 3, 4, 5, and 6)

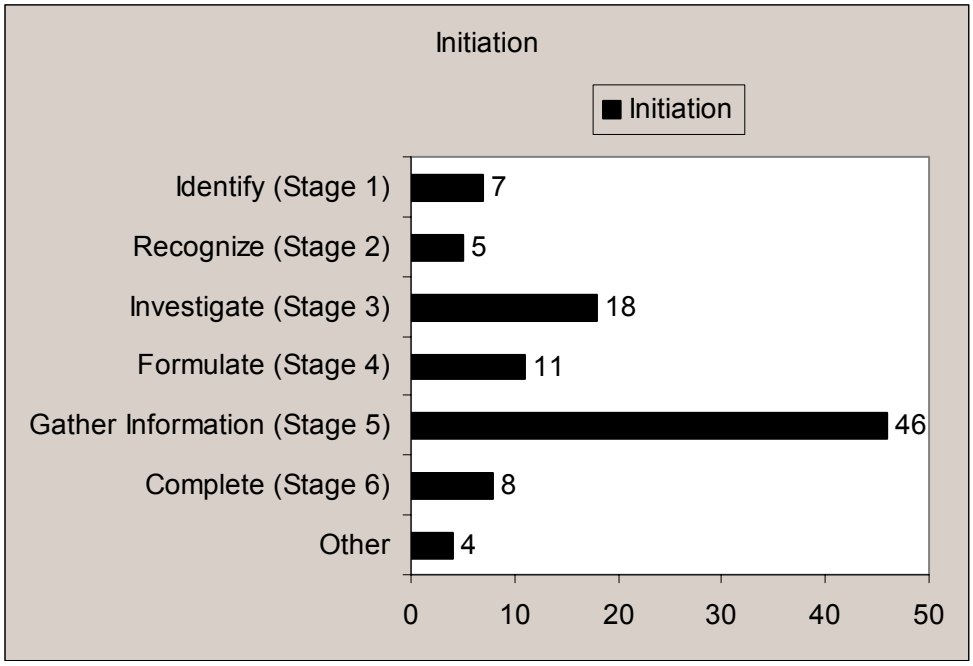
APPENDIX L
ORGANIZATIONAL MODEL, RESULTS


Factors
Students' search for educational/personal Information from the Web and Internet's activities.
The majority experienced stages 3, 4, 5, and 6 of Kuhlthau's model.
Although all experienced Internet anxiety, Internet time delay anxiety was most.
Feelings and with positive and negative analysis, showed patterns similar to Kuhlthau's study.
Although males and females behaved similarly concerning feelings and six stages, some differences were found.

APPENDIX M
KUHLTHAU SIX STAGES STUDY RESULTS

Appendix M

Kuhlthau six stages study results



Note
This is a partial figure from Kuhlthau study (1990, p. 23). The total who responded to initiation was 323 persons. The results for midpoint and closure were different from initiation.

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